GDS Corp

Gas and Flame Detection

Operation and Maintenance Manual

GDS-58NXP Sample Draw System

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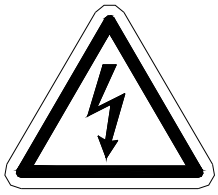

CAUTION: FOR SAFETY REASONS THIS EQUIPMENT MUST BE OPERATED AND SERVICED BY QUALIFIED PERSONNEL ONLY. READ AND UNDERSTAND INSTRUCTION MANUAL COMPLETELY BEFORE OPERATING OR SERVICING.

ATTENTION: POUR DES RAISONS DE SÉCURITÉ, CET ÉQUIPEMENT DOIT ÊTRE UTILISÉ, ENTRETENU ET RÉPARÉ UNIQUEMENT PAR UN PERSONNEL QUALIFIÉ. ÉTUDIER LE MANUE D'INSTRUCTIONS EN ENTIER AVANT D'UTILISER, D'ENTRETENIR OU DE RÉPARER L'ÉQUIPEMENT.

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1 SAFETY INFORMATION

Important – Read Before Installation

Users should have a detailed understanding of GDS-58NXP operating and maintenance instructions. Use the GDS-58NXP only as specified in this manual or detection of gases and the resulting protection provided may be impaired. Read the following WARNINGS prior to use.

WARNINGS

- The GDS-58NXP sample draw system must be installed, operated and maintained in accordance with information contained herein. Installation in any hazardous area must comply with all applicable restrictions, requirements and guidelines for said hazardous areas. It is the end user customer's final decision to ensure that the GDS-58NXP is suitable for the intended use.
- The GDS-58NXP is designed and constructed to measure the level of certain gases in ambient air. Accuracy in atmospheres containing steam or inert gases cannot be guaranteed.
- Do not paint transmitter or sensor assembly.
- Do not operate the GDS-58NXP if its enclosure is damaged or cracked or has missing components. Make sure the cover, internal PCB's and field wiring are securely in place before applying power.
- Do not expose the GDS-58NXP to electrical shock or continuous severe mechanical shock. Protect the GDS-58NXP from dripping liquids and high power sprays.
- Calibrate with known target gas at start-up and check on a regular schedule, at least every 90 days. More frequent inspections are encouraged to spot problems such as dirt, oil, paint, grease or other foreign materials in the sample tubing or in the sensor head.
- Periodically test for correct operation of the system's alarm events by exposing the sample extraction point to a calibration gas concentration above the High Alarm set point.

WARRANTY

GDS Corp. UPS products carry a 2-year limited repair or replacement warranty on electronics and workmanship and one year warranty on sensors. GDS Corp. reserves the right to void warranty claims based on evidence of misuse, abuse, or misapplication. Warranty period starts on date of shipment.

IF YOU HAVE QUESTIONS

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2 GDS-58NXP OVERVIEW

The GDS-58NXP is designed to provide reliable gas detection in locations where the environment is not suitable for the installation of traditional ambient sensors. The GDS-58NXP combines a highly reliable brushless DC sample pump, low flow detection switch, visual flow meter and GASMAX CX gas detector into a single unit that provides 4-20mA analog output, Ethernet, programmable relays including system FAULT and a MODBUS slave interface. The integrated Run/Cal switch and GASMAX CX user-prompted calibration procedure make normal maintenance quick and easy.

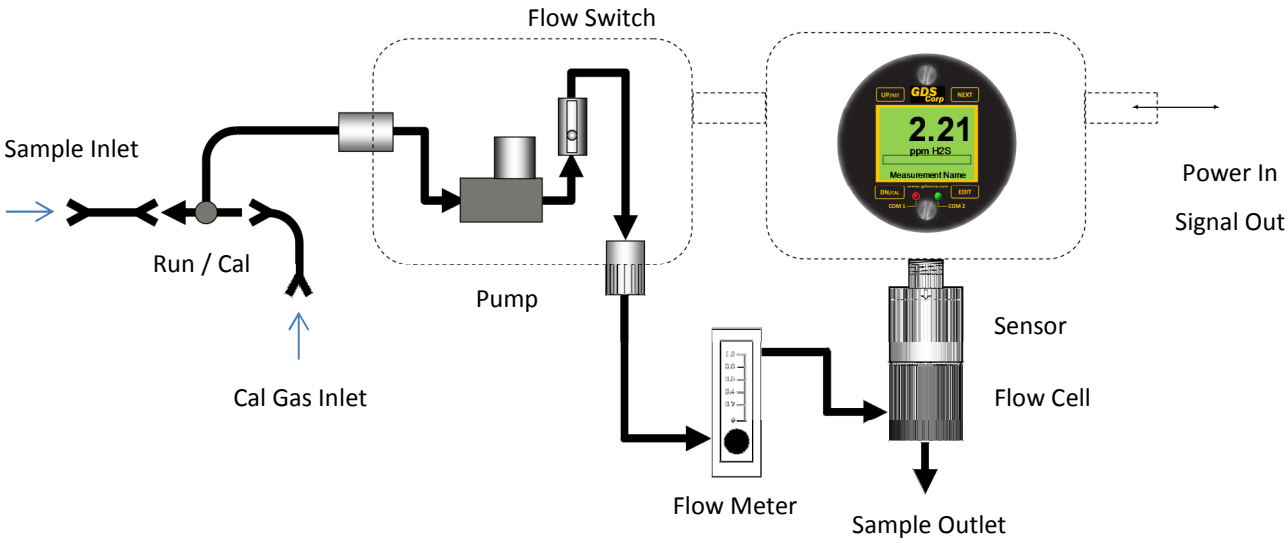


Figure 2-1: GDS-58NXP Flow Diagram

Sample gas enters the unit through the Run/Cal valve where it is drawn into the explosion proof enclosure by the pump after passing through the first of two flame arrestors. Output from the pump is directed through the low flow switch and exits the explosion proof enclosure through the second flame arrestor where it travels to the flow meter and sensor flow cell and then exits the flow cell at ambient atmospheric pressure. Electronics in the GDS-58NXP monitor the flow switch, sensor and internal circuitry and activate the FAULT relay if the sensor fails, if sample flow falls below a preset value or if the internal microprocessor becomes inactive.

GDS-58NXP SENSOR TECHNOLOGY

For toxic gases the GDS-58NXP supports a wide range of electrochemical (“echem”) sensors. These sensors use chemical reactions to sense the presence of gases such as hydrogen sulfide, sulfur dioxide and many others. Each sensor contains an amount of chemical electrolyte that reacts with the target gas to

create free electrons that are amplified and measured. Once the electrolyte is depleted, sensor output will diminish and the sensor must be replaced.

IMPORTANT: TOXIC SENSORS ARE SUBJECT TO ACCELERATED DETERIORATION IF POWER IS NOT APPLIED WITHIN 3 MONTHS OF SHIPMENT FROM GDS CORP.

For combustible gases the GDS-58NXP supports both a traditional catalytic bead ("cat bead") sensor and the GDS-IR infrared sensor.

Catalytic bead sensors 'burn' combustible gas using a catalyst that operates at high temperature. An increase in temperature indicates the presence of gas. Catalytic bead sensors can detect any combustible gas, but the fact that the active bead is in direct contact with the gas can result in damage or reduced sensitivity if the gas contains chemicals that deactivate or temporarily inhibit the operation of the catalyst. Catalytic material is used each time the sensor is exposed to combustible gas and as a result the sensor will lose sensitivity over time.

Infrared sensors use the fact that hydrogen-carbon bonds found in all hydrocarbon gases absorb infrared light at certain frequencies. The sensor is designed such that the target passes between the source and detector, and a reduction in detector output indicates the presence of gas. Infrared sensors cannot be poisoned or damaged by chemicals in the target gas and typically have a long life. GDS-IR sensors carry a 5 year warranty on the electronics and a 12 year warranty on the IR source.

IMPORTANT: INFRARED SENSORS CANNOT DETECT COMBUSTIBLE LEVELS OF HYDROGEN GAS

Photoionization detectors (PID sensors) are used to detect volatile organic compounds such as benzene or toluene. PID sensors use high energy ultraviolet light to partially ionize complex molecules and measure the resulting free electrons. Each VOC has a different 'ionization potential (IP)' energy level that is measured in 'electron-volts', or eV, and a given PID sensor will detect all compounds present with IP values that are equal to or lower than the rated eV of the PID sensor lamp. PID sensor lamps eventually wear out and can be factory refurbished.

SAMPLING APPLICATIONS

When sampling from a static area, mount the GDS-58NXP as close as possible to the extraction point. Try to keep the unit above the sampling point so that any moisture that condenses inside the tubing flows back to the source. GDS Corp recommends the installation of #1200-0387 end-of-line dust filter at the pickup point if the area contains significant amounts of dust or particulates (See Fig. 2-2).

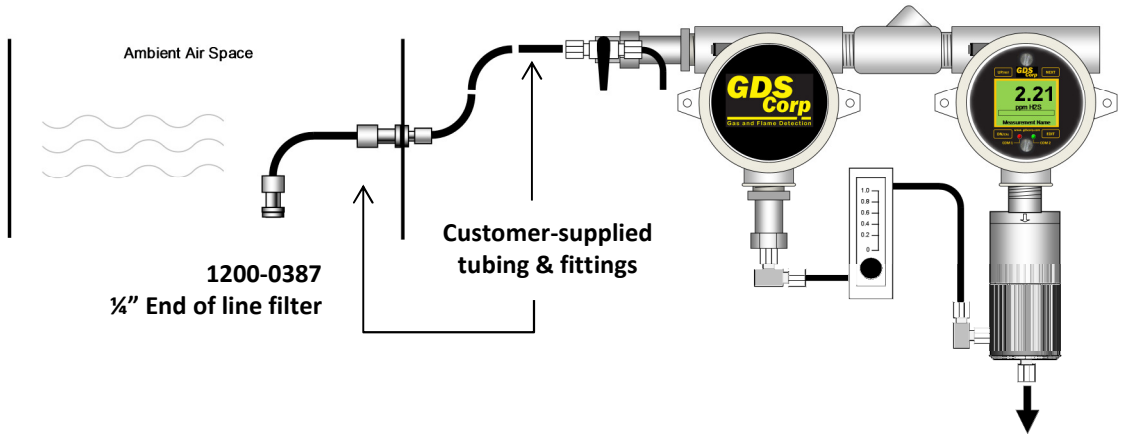


Figure 2-2: GDS-58NXP Ambient Air Sampling

Sampling inside air conditioning ducts presents several problems for ambient sensors. Rapid air flow can damage the sensor, access for calibration or maintenance is difficult, and non-linear gas distribution can result in errors. Using a GDS-58NXP with a #20-0141 Duct Sample Kit simplifies installation, maintenance and calibration and samples a larger cross-section of the duct stream (See Fig. 2-4).

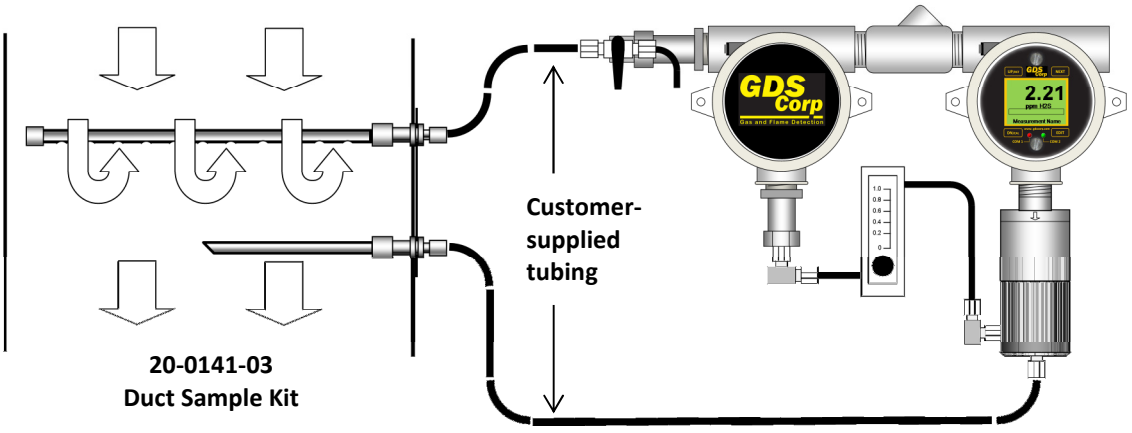


Figure 2-3: GDS-58NXP Air Duct Sampling

3 GDS-58NXP HARDWARE

The GDS-58NXP consists of two interconnected NEMA 7 explosion proof enclosures that contain the sample pump and flow switch (left side) and GASMAX CX gas monitor, sensor and flow cell (right side). Gas enters and exits the left side enclosure via explosion proof flame arrestors, passes through the flow meter and into the sensor flow cell. Figure 3-1 shows the basic single-channel configuration.

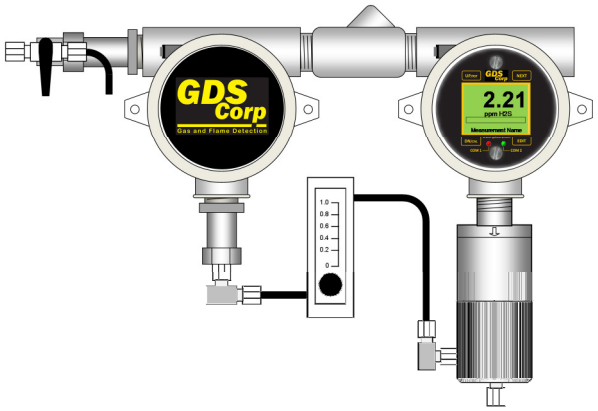


Figure 3-1: GDS-58NXP with Single Sensor

The GDS-58NXP is also available in a dual-channel configuration that supports both toxic and combustible sensors. The most common configuration combines sensors for methane and hydrogen sulfide. Figure 3-2 shows an example dual-channel configuration.

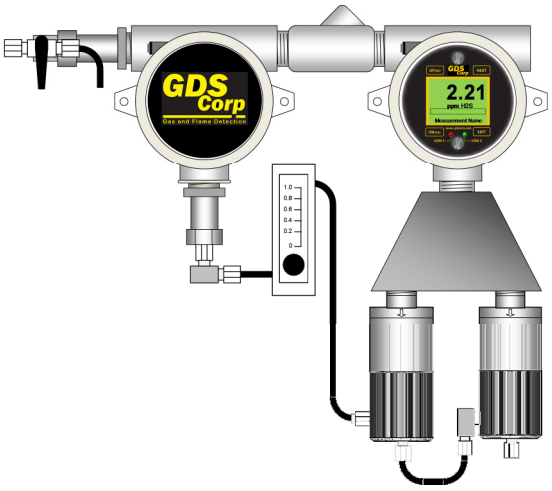


Figure 3-2: GDS-58NXP with Dual Sensors

The GDS-58NXP also supports the GDS Corp GDS-IR high performance infrared sensor for hydrocarbons or carbon dioxide. Figure 3-3 shows an example configuration with the GDS-IR. Configurations that combine a GDS-IR with a second toxic sensor are also supported.

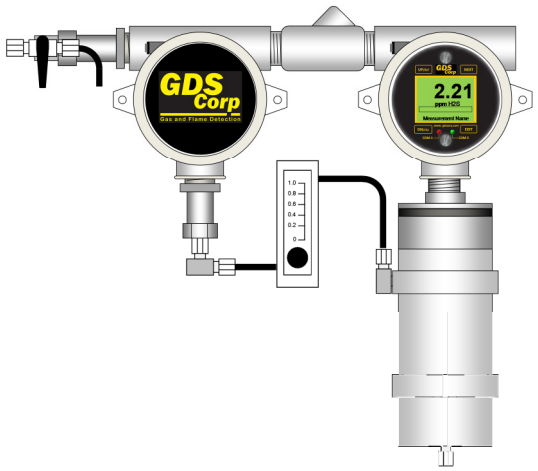
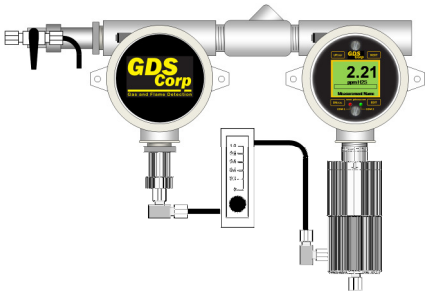


Figure 3-3: GDS-58NXP with GDS-IR Sensor

4 INSTALLATION

SELECTING A MOUNTING LOCATION

As compared to a fixed point gas detector, the GDS-58NXP sample draw system provides a good deal of flexibility when choosing a mounting location. Consider the following when considering where to install the GDS-58NXP:



- Locate the GDS-58NXP where it will be easy to service and calibrate. The high visibility LCD color screen may provide a sufficient visual warning of hazardous conditions without the need to install a dedicated strobe.
- Minimize the length of sample tubing. Lengths up to 50 feet will incur no more than 30 seconds of sample delay.
- Mount the GDS-58NXP at or above the sample point if possible to minimize condensation
- Keep the sample pickup point from becoming submerged in liquid. The sample pump is capable of drawing water to a height of 15 feet. *If liquid enters the flame arrestor or sample pump, damage will occur.*
- If it is necessary to tie the sample outlet back to the sample source, make sure there are no obstructions or restrictions. Any increase in pressure inside the sensor flow cell *will result in reading errors.*

MOUNTING THE GDS-58NXP

The GDS-58NXP standard enclosure is a dual aluminum explosion-proof enclosure and is available standalone, on a 14.5” x 17” painted steel plate or in a 24” x 24” non-metallic or stainless steel enclosure. The GDS-58NXP must be mounted vertically for the flow switch and flow meter to operate properly.

INLET TUBING

Specifications for the inlet tubing depend on the target gas. Long runs of sample tubing will cause a significant delay between the appearance of gas and the resulting warning. Small diameter stainless steel (1/4” OD) is ideal for most gases. Flexible tubing or tubing manufactured from Teflon or PTFE may also be used.

Inlet Delay Calculation

For ¼” OD tubing, allow 5 seconds delay for every 10 feet of sample line

Smaller diameter tubing results in faster response because of the smaller total volume of gas that must be drawn from the sample point. Tests have shown that it takes approximately 3.5 minutes for a sample to be drawn through 500 feet of 1/4” OD flexible tubing; this gives a delay rate of roughly 0.4 seconds per

foot of tubing. Larger diameter tubing with higher internal volume will result in a longer delay, while smaller tubing may be subject to blockage from condensed water droplets or dirt particles.

NOTE: THE SAMPLE PUMP IS CAPABLE OF PULLING UP TO 7.0 PSI VACUUM, ENOUGH TO LIFT WATER OVER 15 FEET. CARE SHOULD BE TAKEN NOT TO SUBMERGE THE SAMPLE EXTRACTION POINT IN LIQUID AS THE PUMP WILL QUICKLY FILL THE FLAME ARRESTORS, FLOW SWITCH, FLOW METER AND SAMPLE FLOW CELL WITH LIQUID.

SAMPLE EXHAUST

Changes in ambient pressure will affect the output from most sensors, and allowing the sample to exhaust directly to the atmosphere will minimize these affects. Long runs of tubing connected to the sample outlet may increase the backpressure inside the sensor flow cell and cause higher than normal readings. Returning a sample to a process stream may be desirable and will work if the process stream is only slightly above ambient (< 5" of water column) and has a relatively constant pressure.

IMPORTANT: DO NOT RESTRICT THE SAMPLE EXHAUST OUTLET. A BUILDUP OF PRESSURE IN THE SAMPLE FLOW CELL MAY DAMAGE THE SENSOR AND WILL RESULT IN INCORRECT READINGS.

DC POWER & SIGNAL CONNECTIONS

To access the GDS-58NXP signal and power connections, remove the right-hand-side cover on the GDS-58NXP explosion-proof enclosure, loosen the 2 thumbscrews holding the display assembly and remove it. The display will remain connected to the IO/Power Supply PCB mounted in the back of the enclosure by a short ribbon cable. Route the power and signal wires through the right-hand-side conduit entry and connect to terminal block "TB1" (see Fig. 4-1).

Recommended Wire Gauge	
< 100 ft	#18 GA
100 to 500 ft	#16 GA
500 to 1000 ft	#14 GA

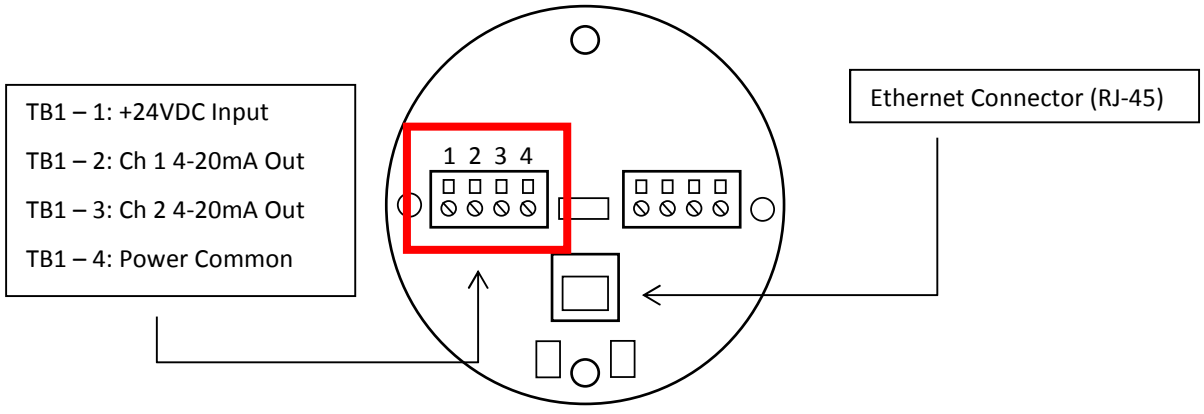


Figure 4-1: GASMAX CX I/O Board

NOTE: GDS CORP ALWAYS RECOMMENDS USING SHIELDED WIRE FOR SIGNAL AND POWER CABLE**.**

ETHERNET CONNECTION

The GDS-58NXP provides an industry-standard 10/100 Mbit RJ-45 Ethernet connection on the main I/O board (see Fig 4-1). Standard Ethernet connection links can be up to 100 m / 300 ft in length. The GDS-58NXP Ethernet interface provides both MODBUS/TCP access to the internal MODBUS database as well as a built-in web server that allows remote monitoring on any Ethernet device that supports a standard web browser.

RELAY & MODBUS CONNECTIONS

The GASMAX CX Relay / dual MODBUS RTU slave interface is connected "piggyback" to the back of the GASMAX CX Display Assembly and supplies three level alarm relays, a FAULT relay and dual RS-485 Modbus RTU serial ports.

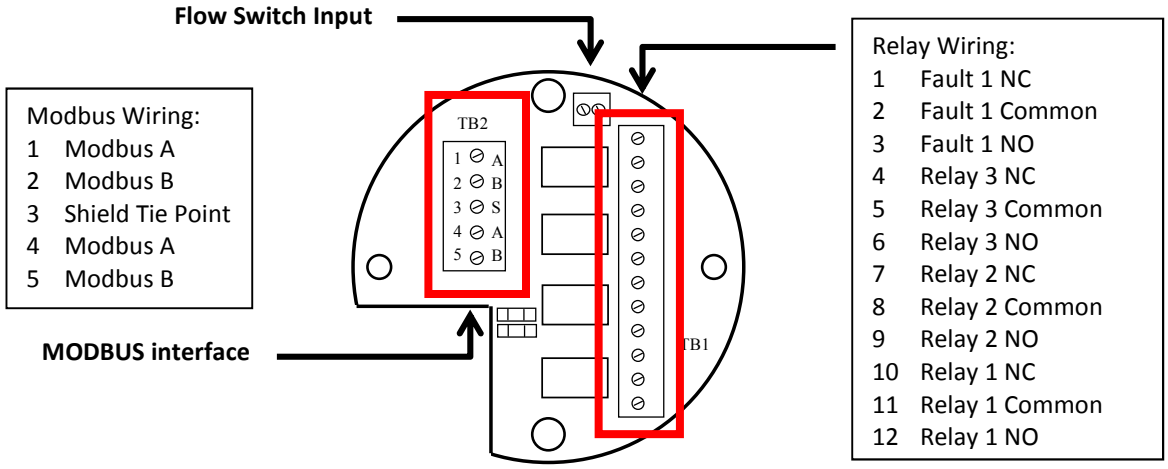


Figure 4-2: RELAY / MODBUS Connections

Relays K1, K2 and K3 can be programmed to respond to Alarm 1, Alarm 2 or Alarm 3 as well as fault and other channel or system-level operations.. Alarms can be programmed to trigger above or below a certain value, work as normal or 'failsafe' and can be made to latch if desired. Relay K4 indicates a FAULT condition in the sensor, microprocessor or flow system.

WARNING: RELAY CONTACTS ARE RATED FOR RESISTIVE LOADS ONLY! INDUCTIVE LOADS MAY CAUSE ARCING WHICH SHORTENS LIFE AND MAY INTERFERE WITH SENSOR DATA.

OPTIONAL ANALOG WIRING JUNCTION BOX [RWJB]

When interconnect wiring sizes are larger than #20 gauge the GDS-58NXP can be fitted with an external analog wiring junction box. This junction box simplifies field wiring and provides auxiliary power and ground terminals for convenience when adding local strobe lights or horns.

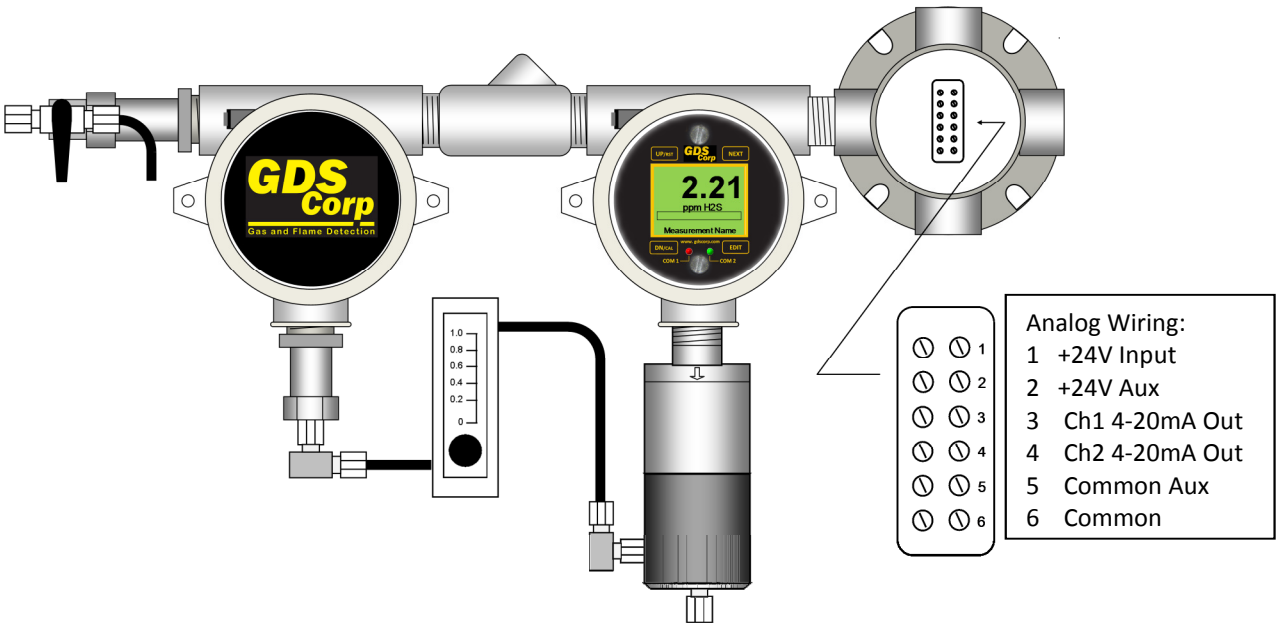


Figure 4-3: GDS-58NXP with Optional Analog Wiring Junction Box (RWJB)

OPTIONAL MODBUS WIRING JUNCTION BOX (MBJB)

The GDS-58NXP MODBUS RTU interface allows remote controllers or PLCs to monitor most aspects of operation, including real-time data, range and alarm setpoints and alarm and fault status bits. The GDS-58NXP interface supports RS-485 differential signaling only.

Access to each MODBUS RS-485 interface is via TB2 on the optional Relay / MODBUS board mounted on the back of the GASMAX CX display module (See Fig. 5-3). Separate input and output terminals for MODBUS “A” and “B” signals are available. A center terminal to tie incoming and outgoing shield connections is also provided.

MODBUS system architecture requires that the devices in any MODBUS loop be connected in a daisy-chain layout. This minimizes signal reflections and improves signal noise margin. A MODBUS Termination Jumper installs a load resistor across the MODBUS signal lines and should only be set to “A” (ON) at the last device in the string.

Cable selection for MODBUS systems is important for both signal integrity and power distribution. MODBUS / RS-485 transmissions use low-voltage differential signaling to achieve reasonable data rates

over very long distances, up to 4000 feet without a repeater. For MODBUS data signals, GDS Corp recommends 20GA to 24GA twisted shielded cable. Daisy-chain power distribution may require larger gauge wire since it is critical that the supply voltage for the GDS-58NXP at the far end of the string not fall below 22VDC during power-up.

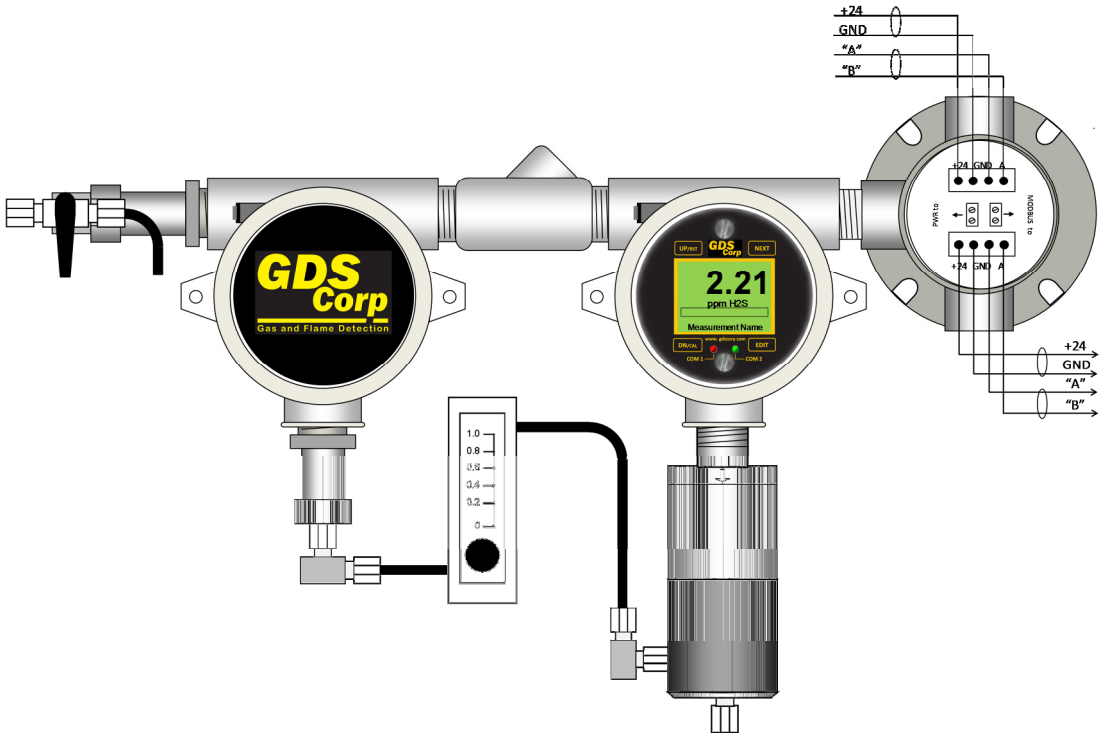


Figure 4-4: GDS-58NXP with Optional Modbus Wiring Junction Box (MBJB)

Note that while the GDS-58NXP has two sets of wiring terminals for MODBUS "A" and "B" signals, daisy-chain power wiring requires that two wires be installed in the "+24" and "GND" terminals on the GDS-58NXP I/O Power Supply board. This can be difficult if wire sizes are larger than #18GA. For these reasons, if MODBUS is required GDS Corp recommends the addition of the MODBUS Wiring Junction Box (see Fig 4-4). This option minimizes the need to access wiring inside the GDS-58NXP, provides individual wire landing points for incoming and outgoing MODBUS and power wiring and shields, and makes it easy to temporarily disconnect the GDS-58NXP power or MODBUS connections without affecting any other MODBUS device.

5 SETUP AND OPERATION

UNDERSTANDING THE USER INTERFACE

Once installed, apply power to the GDS-58NXP and verify that the LCD display is active. There are four magnetic switches on the face of the GDS-58NXP, arranged in a quadrant around the display. Starting in the upper right these are labeled NEXT, EDIT, DN/CAL and UP/RST. To activate, or "press" a magnetic switch, swipe the magnet near the switch.

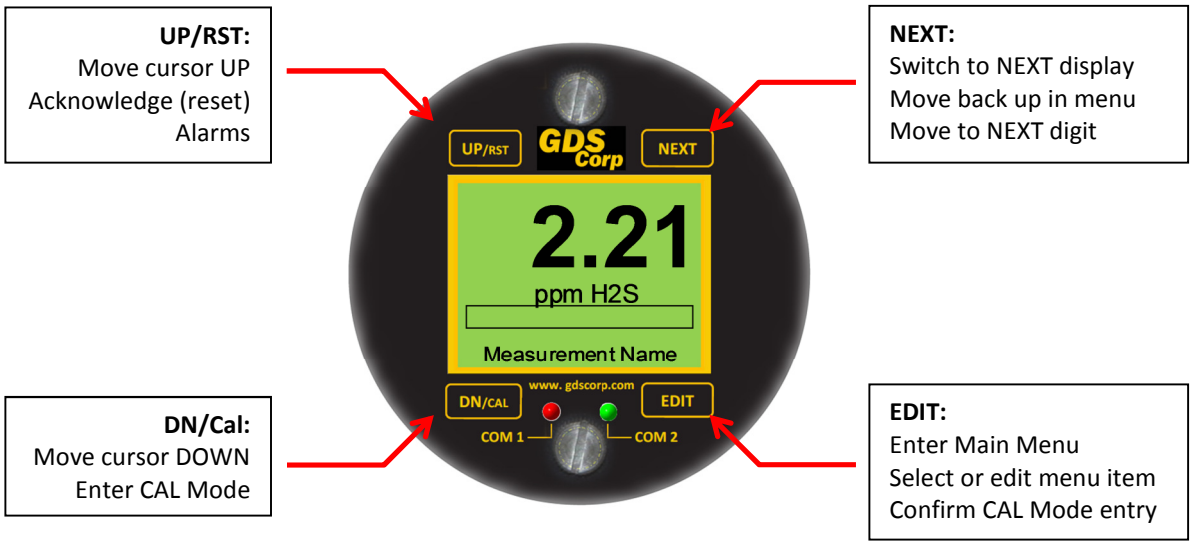


Figure 5-1: GDS-58NXP Display

Activating DOWN/CAL, followed by EDIT, while in display mode initiates calibration mode. For the balance of this manual, the term "press" will be used to describe activation of any key via the magnetic wand. Pressing the NEXT key causes the GDS-58NXP display to sequence through the available display screens.

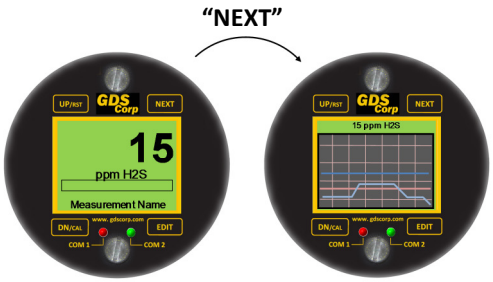


Figure 5-2: Single Channel Display Sequence

In single channel systems, pressing the NEXT key will cause the display to alternate between the DATA display and TREND display. The DATA display screen shows the current value in calibrated engineering

units (See Fig. 5-1). A horizontal bargraph tracks the current value and shows the Alarm 1 and Alarm 2 values in graphical form. The user-programmable Engineering Units ("Eunits") and Measurement Name text strings are shown below the real-time reading. The TREND screen shows the most recent 30 minute graph as well as the alarm levels.

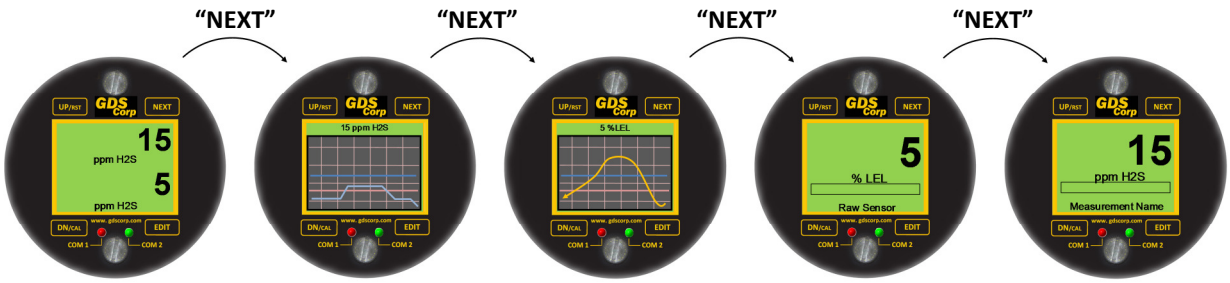


Figure 5-3: Dual Channel Display Sequence

In dual channel systems, pressing the NEXT key will cause the display to sequence through five different screens: DUAL DISPLAY screen that shows data from both channels, then Channel 1 TREND, followed by Channel 2 TREND, and then Channel 1 DATA, and finally Channel 2 DATA.

At the bottom of the front cover are two LEDs that monitor communications activity. Flashing indicates sent or received data. These can be programmed to indicate activity on the Ethernet channel and/or one or both of the MODBUS serial channels.

CHANNEL SETUP

Channel / sensor information is pre-programmed and tested at the factory. All GDS Corp 10-98xx Smart Sensors carry a database of sensor information that includes zero and span values, calibration setpoint, calibration gain and offset information and more. When a replacement sensor is installed, the sensor's calibration constants are automatically uploaded into the GDS-58NXP. If a different type of sensor is installed, the GDS-58NXP will prompt the user for permission to upload the sensor's complete database.

NOTE: GDS-IR SENSORS DO NOT INCLUDE SETUP INFORMATION AND MUST BE PROGRAMMED MANUALLY.

PROGRAMMING ALARM LEVELS

Each channel in the GDS-58NXP offers three independently programmable alarm levels as well as a negative fault level threshold. Each alarm can be set to alarm ABOVE or BELOW a given value, as well as a

programmed for independent ON DELAY or OFF DELAY times. See Chapter 10 (“User Menus”) for more information. To access the alarm setting menu, go to EDIT-CHANNEL SETTINGS – CHANNEL – ALARM.

PROGRAMMING RELAYS

Once channel alarm levels are programmed, then each of the four alarm relays can be programmed to activate once a given alarm condition exists. Alarm relays are dry contact SPDT and may be configured as normal or FAILSAFE (“normally open held closed”). Power must be supplied from an external source and should be fused. The normally-open, common and normally-closed contact wiring layout is shown in Figure 4-2.

STARTUP

Apply power to the GDS-58NXP and confirm that the sign-on screen appears and that the sample pump is operating. Allow the unit to warm-up for the recommended interval (See Chapter 9). In some cases, electrochemical sensors will start off in an “overrange high” condition and drift down to zero, while in others, the sensor will start from “negative fault” and drift up towards zero. In either case, if the sensor remains in overrange or fault for an extended period of time, it may be faulty and would need to be replaced.

Once the sensor or sensors have stabilized, test the low flow warning switch by turning the Run/Cal valve approximately half-way between Run and Cal, or by closing the adjustment valve on the flow meter. The display screen should show a FAULT and flash red. Open the flow meter valve or set the Run/Cal valve to either position and verify that the flow fault disappears.

6 CALIBRATION

Calibration is critically important to ensure correct operation of the GDS-58NXP. The built-in CAL MODE function is designed to make calibration quick, easy and error free; a successful ZERO and SPAN calibration requires only four keystrokes. During CAL MODE zero and span, the sensor output is disconnected and the GDS-58NXP transmits a fixed mA value, called the CAL MARKER, to notify the receiving device that a calibration is in progress. During the following CAL PURGE DELAY time, the GDS-58NXP transmits a fixed 4.0 mA signal to prevent external alarms during calibration. In the case of Oxygen sensors, during CAL PURGE DELAY the output simulates a typical atmospheric reading of 20.8%. CAL MODE automatically exits if no keystrokes are detected after 5 minutes.

Follow these GDS-58NXP calibration guidelines:

- Calibration accuracy is only as good as the calibration gas accuracy. GDS Corp calibration gases are traceable to NIST (National Institute of Standards and Technology).
- **Never use calibration gas that has passed its expiration date.**
- Check the SPAN GAS VALUE setting and make sure it matches the calibration gas. (See Fig. 6-2)
- Always use a GDS Corp calibration cup that completely surrounds the sensor head.
- Be sure to use ZERO AIR, a mixture of 21% oxygen and 79% nitrogen, as a zero reference unless you are certain that no target gas exists in the area. Ambient gas may result in an 'elevated zero' condition that will cause a FAULT to occur once the ambient gas is no longer present.
- **Always calibrate a new sensor before depending on the device for personnel or equipment safety**
- Calibrate on a regular schedule. GDS Corp recommends a full calibration every 3 months, with periodic 'bump tests' on a more frequent basis to ensure that the sensor has not been affected by temperature extremes or the presence of incompatible gases.

CALIBRATION PROCEDURE

Before beginning calibration, make sure you have the following items: A cylinder of calibration gas, fixed flow regulator and a length of flexible tubing. A cylinder of 'zero air' may be necessary if the absence of target gas cannot be confirmed in the sample area.

To calibrate a GDS-58NXP sample draw:

1. If using Zero Air, set the Run/Cal valve to the CAL position (pointing to the right) and connect the cylinder of zero air to the GDS-58NXP calibration port. Turn on the regulator and verify flow on the flow meter. Otherwise, allow the current sample to continue to flow into the GDS-58NXP.
2. Press the NEXT key until the corresponding DATA Display screen is shown.
3. Press the DOWN / CAL key and within 5 seconds press the EDIT key to enter CAL MODE.

4. The screen will display “APPLY ZERO”. Allow a few seconds for the reading to stabilize and press the EDIT key to complete the ZERO calibration. A “ZERO CAL SUCCESSFUL” message should appear.
5. If not already done, set the Run/Cal value to the CAL position and connect the cylinder of span gas.
6. When the “APPLY SPAN” message appears, turn on the regulator and verify flow on the flow meter. After the reading is stable, (approximately 1-2 minutes) press the EDIT key to complete the SPAN GAS calibration. If the SPAN calibration is successful, the display flashes REMOVE CAL GAS and starts the CAL PURGE delay.
7. Immediately shut off the regulator and set the Run/Cal valve to RUN. At the end of the CAL PURGE delay, the GDS-58NXP output is re-enabled and the unit is fully operational.

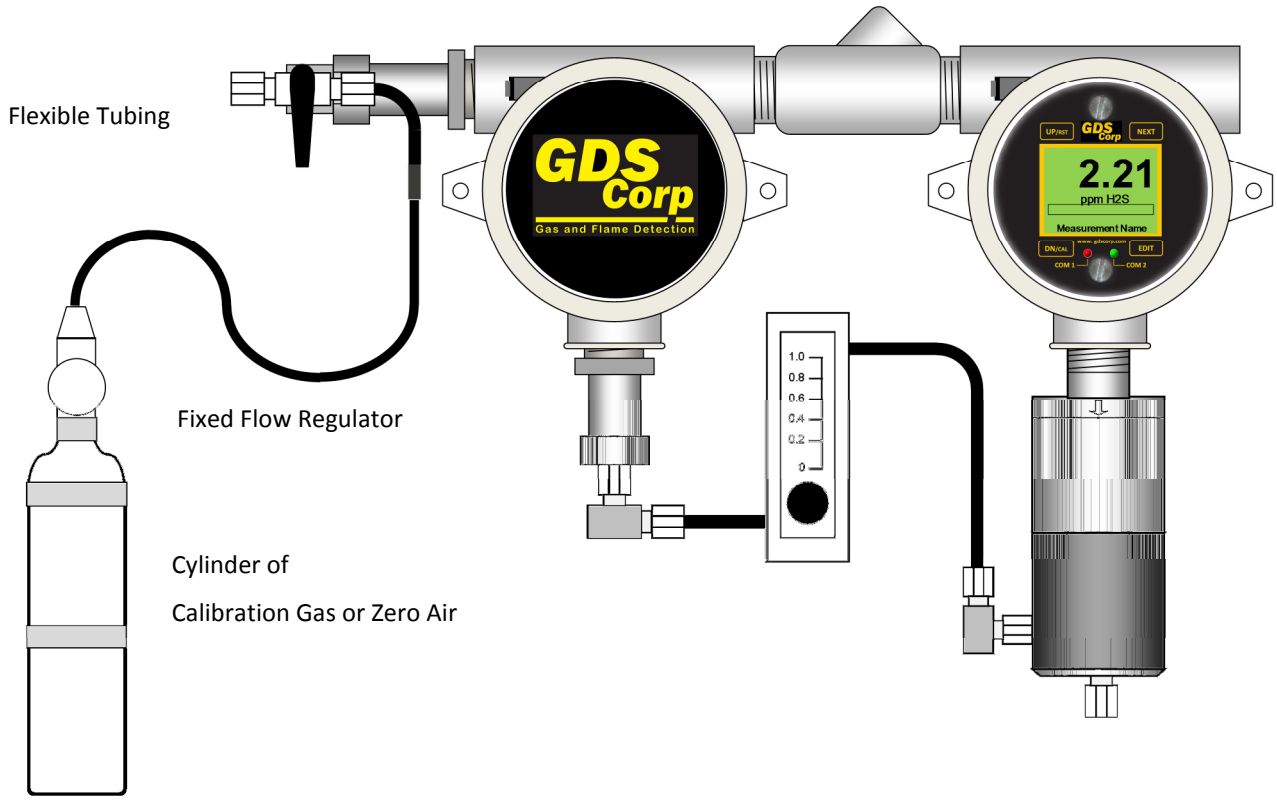


Figure 6-1: GDS-58NXP Calibration Setup

7 MAINTENANCE

Normal maintenance for the GDS-58NXP involves verification of proper sample flow and periodic calibration using accurate gas standards. GDS Corp recommends calibration at least every three months, or more often if temperature extremes, vibration, the presence of incompatible gases or other environmental factors may accelerate the deterioration of the sensor element. Calibration should also include inspections for clogged or wet sensor heads, cracked or damaged enclosures and water incursion inside conduit or junction boxes. The sample pump is sealed and does not have any user-serviceable parts. The flow switch is sealed and does not have any user-serviceable parts.

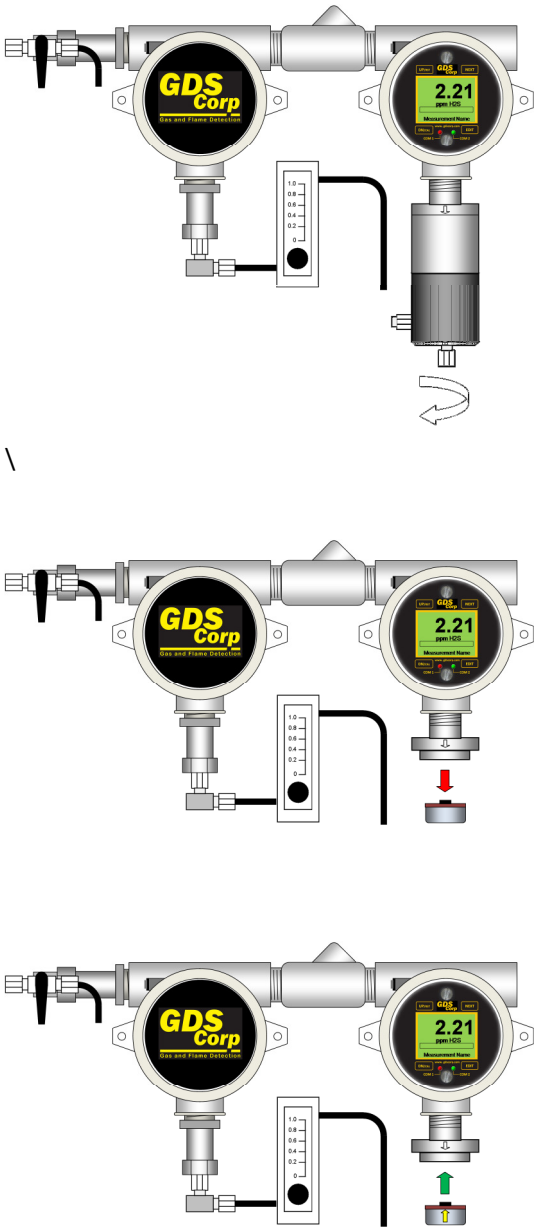
In the event that water or other liquid enters the GDS-58NXP, the flow meter, flow switch and flame arrestors will need to be replaced or cleaned thoroughly. The flame arrestors can be cleaned and dried using compressed air or heat. The sensor should not require replacement unless the liquid level in the flow cell was excessive due to backpressure or a clogged outlet.

SENSOR REPLACEMENT – TOXIC AND BRIDGE SENSORS

If a toxic or bridge sensor shows FAULT, does not respond to gas or can no longer be calibrated, it should be replaced. GDS-58NXP sample draw systems use GDS Corp type 10-98XX toxic or bridge sensors, where the XX is the sensor type. The range value should also be specified when ordering replacement sensors. For example, a replacement H2S sensor for 0-100 ppm would be “10-9815-R0100”.

To replace a GDS-58NXP toxic or bridge sensor (See Fig. 7-1):

1. If necessary, declassify the area or remove power to the GDS-58NXP.
2. Disconnect the sample inlet tube to the sensor flow cell.
3. Unscrew the sensor head cover and flow cell.
4. Remove the old sensor by pulling straight down.
   IMPORTANT: DO NOT TRY TO UNSCREW THE SENSOR. PULL STRAIGHT DOWN!
5. Compare sensor part numbers and make sure the new sensor and old sensor match.
6. Carefully install the replacement sensor by aligning the arrow on the sensor with the arrow engraved on the sensor head. Push straight up until the sensor connector seats firmly into the sensor connector.
7. Reinstall the sensor head cover and flow cell by CAREFULLY screwing the cover onto the sensor head.
   IMPORTANT: IF THE SENSOR FALLS OUT OF THE SOCKET DURING THIS STEP, IT CAN BE DAMAGED. USE CAUTION WHEN REINSTALLING THE COVER AND FLOWCELL.
8. Apply power and allow the sensor to warm up properly and perform a full calibration.



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Step 1: If necessary, declassify area and disconnect power

Step 2: Disconnect the sample inlet tube to the sensor flow cell

Step 3: Unscrew the sensor flow cell and sensor head cover

Step 4: Pulling straight down, remove the existing sensor.

Step 5: Compare the new sensor with the old sensor and verify identical part numbers

Step 6: Install the new sensor by aligning the arrow on the sensor with the arrow on the sensor head and push straight up.

Step 7: Reassemble the sensor head cover and flow cell and reattach the sample inlet tube.

Step 8: Apply power, allow the sensor to warm up and perform a complete calibration.

Figure 7-1: Sensor Replacement

8 TROUBLESHOOTING GUIDELINES

TOXIC SENSOR INDICATES FAULT OR OVERRANGE

- Certain toxic sensors indicate off-scale low or high at power up and quickly drift towards zero. This is normal behavior.
- Toxic sensors showing constant FAULT: If local, remove sensor and examine for moisture or discoloration. Replace sensor if wet or discolored. If remote, check sensor cable and junction box for moisture or standing water. Remove sensor and examine for moisture or discoloration. FAULT indication generally indicates sensor useful life is exhausted.
- Toxic sensors left unpowered for more than 3 months are subject to accelerated degradation and may demonstrate a permanent loss of sensitivity.

TOXIC SENSOR WILL NOT CALIBRATE

- Sensor reading during zero calibration exceeds upper limit of zero – sensor is defective and should be replaced.
- Sensor reading during span calibration too low – sensor may be defective and should be replaced.

BRIDGE SENSOR INDICATES FAULT OR OVERRANGE

- Catalytic bead combustible sensors generally indicate off-scale high at power up and quickly drift towards zero as they reach operating temperature. This is normal behavior.
- Combustible sensors showing constant FAULT may have drifted below FAULT alarm level. Try readjusting SENSOR BALANCE to clear FAULT. If unsuccessful, replace sensor.
- Combustibles sensors showing constant OVERRANGE may have defective bead and should be replaced.

BRIDGE SENSOR WILL NOT CALIBRATE

- Sensor reading during zero calibration exceeds limits – readjust SENSOR BALANCE to reset zero if possible. If not, sensor is defective and should be replaced.
- Sensor reading during span calibration too low – sensor may be defective and should be replaced.

RECEIVING DEVICE (4-20mA) AND GDS-58NXP DISPLAYED VALUES DON'T MATCH

- Check that zero and full scale range values match between GDS-58NXP and receiving device (controller). Use DIAGNOSTICS menu to force GDS-58NXP output to 12mA (1/2 scale) and verify appropriate half-scale reading on controller.
- Check for high impedance shorts to ground on 4-20mA wiring.
- If 4-20mA output is off-scale low or high and cannot be adjusted using DIAGNOSTICS mode, IO/Power Supply board may be defective and should be replaced.

CONTROLLER MODBUS DATA INCORRECT

- Verify that MODBUS master is requesting data from correct registers: 31001 for channel 1 and 31002 for channel 2.
- Verify that controller MIN and MAX count settings are correct. MIN counts should be "800" which corresponds to 4mA and MAX counts should be "4000" which corresponds to 20 mA.
- Verify that the GDS-58NXP MODBUS address matches the address programmed into the controller's channel configuration.

CONTROLLER SHOWING MODBUS COMM ERROR

- Check for incorrect MODBUS polarity (swap "A" and "B" if unsure; no damage will occur).
- Verify that MODBUS master is requesting data from correct MODBUS address.
- Verify that MODBUS master is requesting correct registers: 31001 for channel 1 and 31002 for channel 2.
- Verify that there are no other MODBUS slave devices with identical MODBUS address.

GDS-58NXP DISPLAY BLANK

- Verify DC power at IO/Power Supply board, TB1, terminals 1 (+24) and 4 (Gnd).
- Verify ribbon cable connected between IO/Power Supply board and Display Assembly.

9 SPECIFICATIONS

Model	GDS-58NXP Sample Draw System
Power Input	24VDC ± 5% at < 10 watts (Toxic or Bridge sensor) 24VDC ± 5% at < 15 watts (GDS-IR sensor)
Display	64 x128 pixel LCD with engineering units, bargraph and 30-minute trend
Sensor Types	Electrochemical sensors for toxic gases Catalytic bead sensor for combustible gases Photoionization detector sensor for volatile organic compounds GDS-IR infrared sensor for combustibles and CO_2
Draw Distance	Demonstrated up to 500 feet of ¼" OD tubing
Accuracy	+/- 5% of full scale (typical)
Standard Output	Single or dual three-wire 4-20mA current source outputs with fault and overrange indication. Maximum loop resistance is 750 ohms with standard 24VDC supply. RJ-45 10/100 Ethernet port with built-in web server and Modbus / TCP Optional Relay / MODBUS interface with 4x 5A SPDT programmable alarm relays and dual channel RS-485 serial MODBUS
Flow Monitor	Low-flow warning with screen and 4-20mA output fault indication
Temperature	0°C to +50°C Operating **Note**: Ambient temperature below 0°C may keep sample pump from starting
Memory	On-board non-volatile memory retains all user settings
Housing	Aluminum housings (2) with epoxy paint standard #316 stainless steel optional
Dimensions	Width 15" (381 mm), Height 10.5" (267 mm), Depth 5" (127 mm) Shipping weight 16 pounds (7.25 kg), 20"x20"x14" 17" wide x 15" tall painted steel or 304 stainless steel plate 21" wide x 17" tall painted steel or 316 stainless steel plate
Approvals	GASMAX CX monitor CSA Certified Div 1 & 2 Groups B, C, D. Enclosure CSA certified for use in Class I Div 1 areas. Flame arrestors UL certified for use in Class 1 Div 1 areas.
Warranty	Two years on electronics, one year on sensors

	Sensor Type	Min Range	Max Range	Temp Range	Warm-Up
10	Oxygen	0-25% v/v	0-25% v/v	0°C to + 55°C	2 to 4 hours
11	Carbon Monoxide	0-100 ppm	0-9999 ppm	0°C to + 50°C	2 to 4 hours
14	Hydrogen	0-1000 ppm	0-4% v/v	0°C to + 50°C	2 to 4 hours
15	Hydrogen Sulfide	0-10 ppm	0-9999 ppm	0°C to + 50°C	2 to 4 hours
16	Hydrogen Cyanide	0-30 ppm	0-30 ppm	0°C to + 50°C	8 to 12 hours
19	Sulfur Dioxide	0-50 ppm	0-500 ppm	0°C to + 50°C	4 to 8 hours
22	Ethylene Oxide	0-50 ppm	0-200 ppm	0°C to + 50°C	8 to 12 hours
23	Arsine	0-1 ppm	0-1 ppm	0°C to + 40°C	8 to 12 hours
24	Silane	0-25 ppm	0-50 ppm	0°C to + 40°C	8 to 12 hours
27	Hydrazine	0-1 ppm	0-1 ppm	0°C to + 40°C	8 to 12 hours
28	Nitric Oxide	0-25 ppm	0-100 ppm	0°C to + 50°C	8 to 12 hours
29	Nitrogen Dioxide	0-50 ppm	0-200 ppm	0°C to + 50°C	8 to 12 hours
30	Mercaptan	0-15 ppm	0-30 ppm	0°C to + 40°C	8 to 12 hours
31	THT	0-15 ppm	0-30 ppm	0°C to + 40°C	8 to 12 hours
32	Diborane	0-1 ppm	0-5 ppm	0°C to + 40°C	8 to 12 hours
33	H2S Low Humidity	0-100 ppm	0-500 ppm	0°C to + 50°C	2 to 4 hours

Figure 9-1: Toxic Sensor Characteristics

	Sensor Type	Min Range	Max Range	Temp Range	Warm-Up
61	PID, 10.6 eV, low range	0-50 ppm	0-5000 ppm	0°C to + 55°C	4 to 8 hours
62	PID 10.6 eV, high range	0-100 ppm	0-9999 ppm	0°C to + 55°C	4 to 8 hours
64	PID, 10.0 eV, low range	0-5 ppm	0-50 ppm	0°C to + 55°C	4 to 8 hours
70	Catalytic Bead (Methane)	0-100% LEL	0-100% LEL	0°C to + 55°C	4 to 8 hours
71	Catalytic Bead (Other)	0-100% LEL	0-100% LEL	0°C to + 55°C	4 to 8 hours

Figure 9-2: Bridge Style Sensor Characteristics

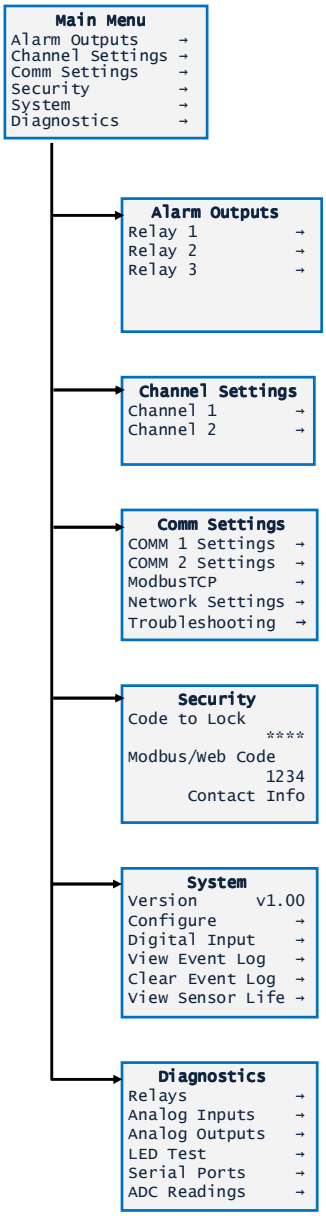
	Sensor Type	Range	Temp Range	Warm-Up
109	Acetylene	0-100% LEL	0°C to + 55°C	4 to 8 hours
110	Methane	0-100% LEL	0°C to + 55°C	4 to 8 hours
111	Propane	0-100% LEL	0°C to + 55°C	4 to 8 hours
112	Isobutane	0-100% LEL	0°C to + 55°C	4 to 8 hours
113	Pentane	0-100% LEL	0°C to + 55°C	4 to 8 hours
114	Cyclopentane	0-100% LEL	0°C to + 55°C	4 to 8 hours
115	n-Butane	0-100% LEL	0°C to + 55°C	4 to 8 hours
116	Ethanol	0-100% LEL	0°C to + 55°C	4 to 8 hours
117	Methanol	0-100% LEL	0°C to + 55°C	4 to 8 hours
118	Propylene	0-100% LEL	0°C to + 55°C	4 to 8 hours
119	Ethylene	0-100% LEL	0°C to + 55°C	4 to 8 hours
120	Hexane	0-100% LEL	0°C to + 55°C	4 to 8 hours
121	Jet-A	0-100% LEL	0°C to + 55°C	4 to 8 hours
122	Diesel	0-100% LEL	0°C to + 55°C	4 to 8 hours
123	Gasoline	0-100% LEL	0°C to + 55°C	4 to 8 hours
124	Isopropyl Alcohol	0-100% LEL	0°C to + 55°C	4 to 8 hours
125	Acetone	0-100% LEL	0°C to + 55°C	4 to 8 hours
126	p-Xylene	0-100% LEL	0°C to + 55°C	4 to 8 hours
127	Ethylene Oxide	0-50% LEL	0°C to + 55°C	4 to 8 hours
128	MEK	0-100% LEL	0°C to + 55°C	4 to 8 hours
129	Styrene	0-50% LEL	0°C to + 55°C	4 to 8 hours
130	Methane (by volume)	0-100% v/v	0°C to + 55°C	4 to 8 hours
131	Propane (by volume)	0-100% v/v	0°C to + 55°C	4 to 8 hours
132	Carbon Dioxide	0-5.0% v/v	0°C to + 55°C	4 to 8 hours
133	Carbon Dioxide	0-3.5% v/v	0°C to + 55°C	4 to 8 hours

Figure 9-3: GDS-IR Sensor Characteristics

10 USER MENUS

The GASMAX CX gas monitor used in the GDS-58NXP has a menu-driven user interface that allows the operator to review and adjust a wide range of settings. In the GDS-58NXP, channel 1 of the GASMAX CX measures the "raw sensor" gas level and channel 2 provides continuous display, output and alarming on the stored value retained in the sequencer memory.

To access the Main Menu, activate the EDIT key with a magnetic wand.



Alarm Output Menu – contains settings that control the four optional alarm relays (if installed). These setting include relay programming, on and off delay, failsafe mode and specific input override.

Channel Settings Menu – contains settings specific to each channel. These include tag names, range, calibration settings and alarm levels.

Comm Settings Menu – contains settings specific to the Ethernet network interface, MODBUS/TCP interface and optional RS-485 serial ports (if installed).

Security Settings Menu – allows the user to restrict operation for some or all of the features as well as provide a programmed contact name.

System Settings Menu – contains settings that are unit specific. These include unit name. time and date, warm-up and calibration delay settings, and Event Log.

Diagnostics Menu – comprehensive set of tools that can be used to activate relays, simulate output values and test serial ports.

Figure 10-1: Main Menu Tree

ALARM OUTPUTS MENU

The Alarm Outputs Menu controls the four optional alarm relays (if installed). These setting include relay programming, acknowledge, failsafe mode and specific input override options.

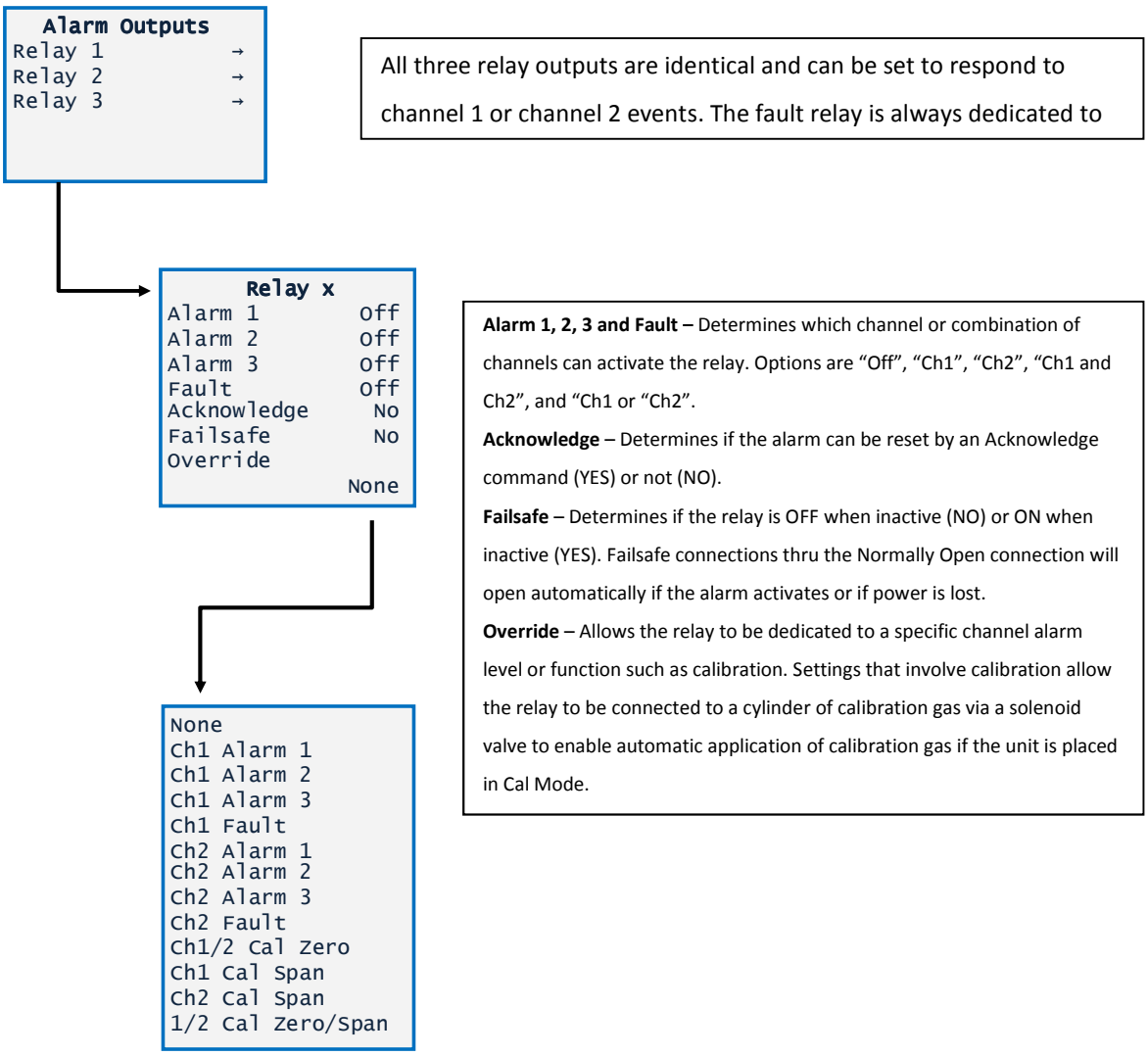

Alarm Outputs
Relay 1 →
Relay 2 →
Relay 3 →
All three relay outputs are identical and can be set to respond to channel 1 or channel 2 events. The fault relay is always dedicated to
Relay x
Alarm 1 Off
Alarm 2 Off
Alarm 3 Off
Fault Off
Acknowledge No
Failsafe No
Override
None
Alarm 1, 2, 3 and Fault – Determines which channel or combination of channels can activate the relay. Options are "Off", "Ch1", "Ch2", "Ch1 and Ch2", and "Ch1 or "Ch2".
Acknowledge – Determines if the alarm can be reset by an Acknowledge command (YES) or not (NO).
Failsafe – Determines if the relay is OFF when inactive (NO) or ON when inactive (YES). Failsafe connections thru the Normally Open connection will open automatically if the alarm activates or if power is lost.
Override – Allows the relay to be dedicated to a specific channel alarm level or function such as calibration. Settings that involve calibration allow the relay to be connected to a cylinder of calibration gas via a solenoid valve to enable automatic application of calibration gas if the unit is placed in Cal Mode.
None
Ch1 Alarm 1
Ch1 Alarm 2
Ch1 Alarm 3
Ch1 Fault
Ch2 Alarm 1
Ch2 Alarm 2
Ch2 Alarm 3
Ch2 Fault
Ch1/2 Cal Zero
Ch1 Cal Span
Ch2 Cal Span
1/2 Cal Zero/Span

Figure 10-2: Alarm Outputs Menu Tree

CHANNEL SETTINGS MENU

The Channel Settings Menu allows the user to adjust individual channel or sensor-specific features. Data in the Channel Settings Menu is uploaded from Smart Sensors, and written back to any local Smart Sensor if changed in the menu.

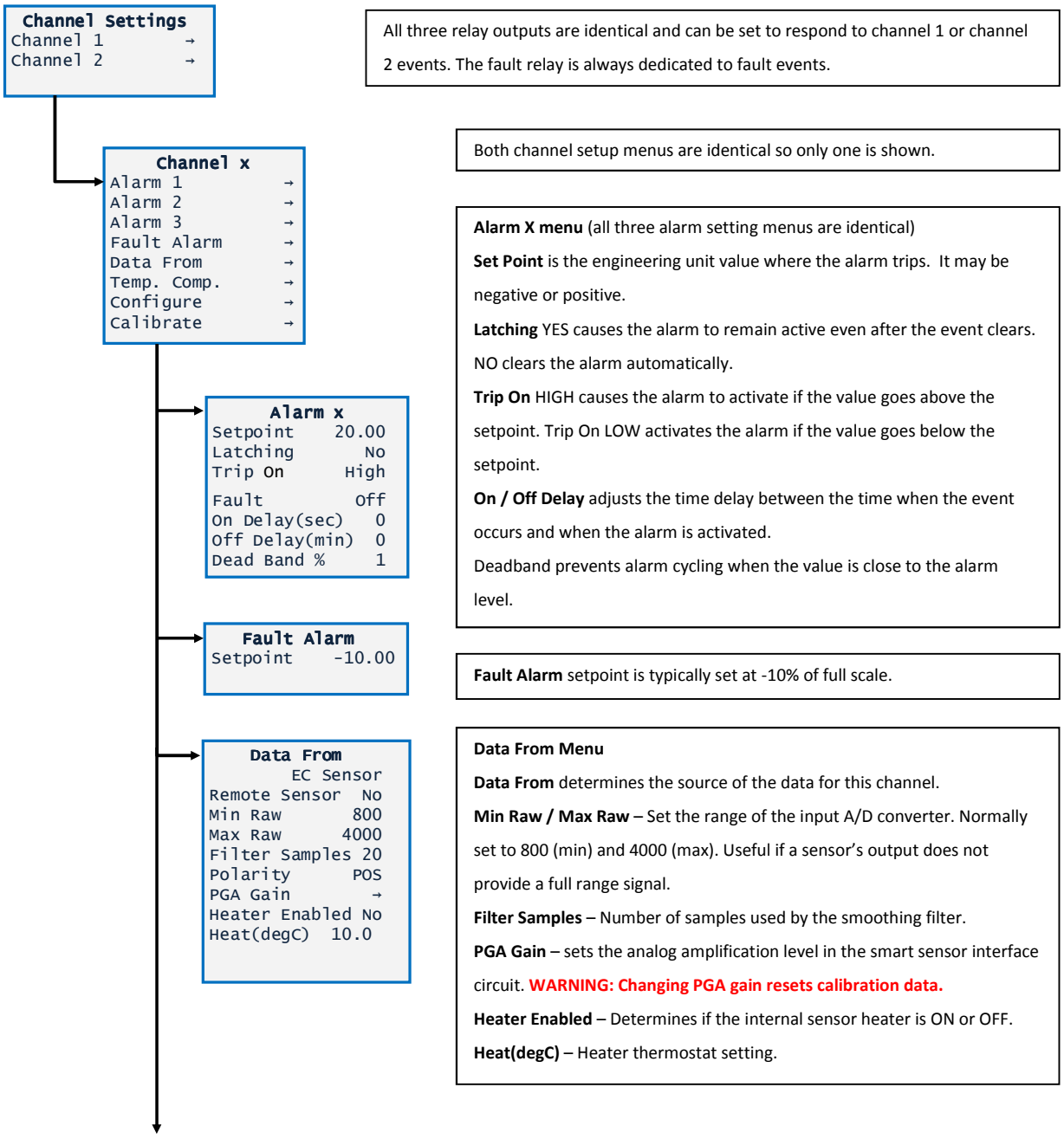
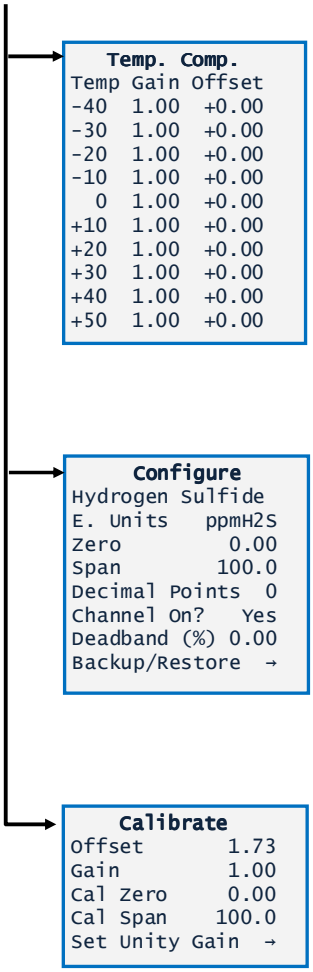

Channel Settings
Channel 1 →
Channel 2 →
All three relay outputs are identical and can be set to respond to channel 1 or channel 2 events. The fault relay is always dedicated to fault events.
Channel x
Alarm 1 →
Alarm 2 →
Alarm 3 →
Fault Alarm →
Data From →
Temp. Comp. →
Configure →
Calibrate →
Both channel setup menus are identical so only one is shown.
Alarm x
Setpoint 20.00
Latching No
Trip On High
Fault Off
On Delay(sec) 0
Off Delay(min) 0
Dead Band % 1
Alarm X menu (all three alarm setting menus are identical)
Set Point is the engineering unit value where the alarm trips. It may be negative or positive.
Latching YES causes the alarm to remain active even after the event clears. NO clears the alarm automatically.
Trip On HIGH causes the alarm to activate if the value goes above the setpoint. Trip On LOW activates the alarm if the value goes below the setpoint.
On / Off Delay adjusts the time delay between the time when the event occurs and when the alarm is activated.
Deadband prevents alarm cycling when the value is close to the alarm level.
Fault Alarm
Setpoint -10.00
Fault Alarm setpoint is typically set at -10% of full scale.
Data From
EC Sensor
Remote Sensor No
Min Raw 800
Max Raw 4000
Filter Samples 20
Polarity POS
PGA Gain →
Heater Enabled No
Heat(degC) 10.0
Data From Menu
Data From determines the source of the data for this channel.
Min Raw / Max Raw – Set the range of the input A/D converter. Normally set to 800 (min) and 4000 (max). Useful if a sensor's output does not provide a full range signal.
Filter Samples – Number of samples used by the smoothing filter.
PGA Gain – sets the analog amplification level in the smart sensor interface circuit. WARNING: Changing PGA gain resets calibration data.
Heater Enabled – Determines if the internal sensor heater is ON or OFF.
Heat(degC) – Heater thermostat setting.

Figure 10-3: Channel Settings Menu Tree (1)



Temperature Compensation compensates for changes in sensor output (gain) and zero value (offset) as sensor temperature changes. Individual values for gain and offset can be entered for eleven points ranging from minus 40C to +60C. Gain and offset values are linearly interpolated between points by the internal microprocessor.

NOTE: These values are typically set by the sensor manufacturer and should not be changed.

Configure Menu

Measurement Name – User-programmable character string to describe the channel. Otherwise called "tag name".

E. Units – User-programmable character string that describes the engineering units value.

Zero – Channel zero value, typically "0".

Span– Channel full scale value. Max value is "9999".

Decimal Points – Determines the number of displayed digits to the right of the decimal point.

Channel On? – Channel ON or OFF setting. An "OFF" channel will have no effect on any alarm or output value.

Deadband (%) – The value, around zero, for which the screen will show "0.0". Eliminates display of small values around zero due to sensor drift.

Calibrate Menu

Offset – Shows the computed offset value based on the latest calibration.

Gain – Shows the computed gain value based on the latest calibration.

Cal Zero – The value for the zero point calibration

Cal Span – The value for span calibration, typically 50% of full scale.

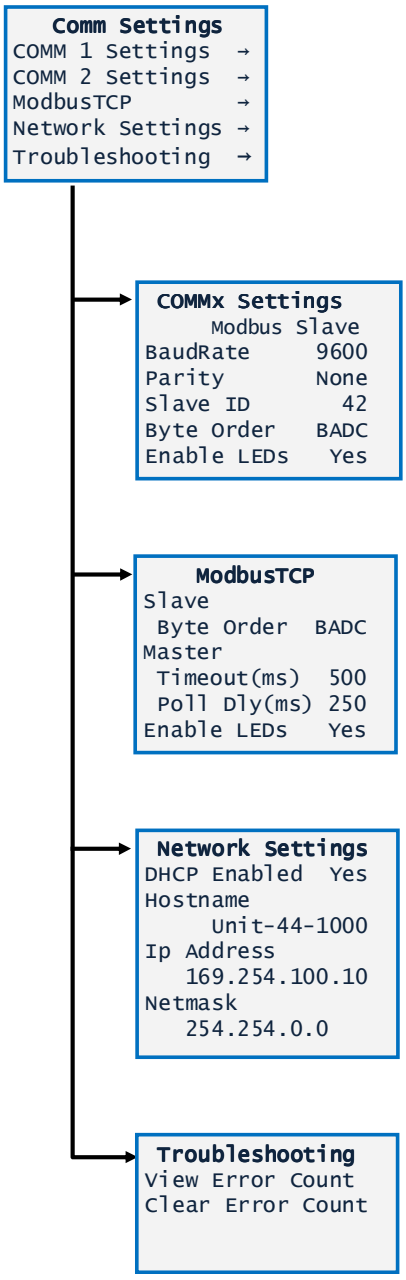
Set Unity Gain – Clears gain and offset to "1.00" and "0.00" respectively.

WARNING: Set Unity Gain resets calibration data.

Figure 10-4: Channel Settings Menu Tree (2)

COMM SETTINGS MENU

The Comm Settings Menu allows the user to configure the Ethernet interface, MODBUS/TCP slave and two optional RS-485 serial interfaces.



Comm X Menu (both comm port setting menus are identical)

Type ("Modbus Slave") determines whether the MODBUS port is a master or slave.

Baud Rate – Sets the baud rate for the serial port. Options are 9600, 19200, 38400, 57600 and 115200 baud.

Slave ID - Sets the MODBUS slave ID for the serial port.

Byte Order – sets the byte order for words larger than 16 bits.

Enable LEDs – If YES, front panel LEDs indicate MODBUS transmission.

MODBUS TCP Menu

Slave Settings:

Byte Order – sets the byte order for words larger than 16 bits.

Master Settings:

Timeout – Length of time (in mSec) that master will wait for a reply before indicating a comm timeout.

Poll Delay – Length of time (in mSec) between sequential read requests.

Enable LEDs – if YES, front panel LEDs indicate MODBUS / TCP transmission

Network Settings Menu

DHCP Enabled – If YES, uses a remote DHCP server to establish a network address. If NO, uses fixed address.

Hostname – Character string that defines device network name

IP Address – Network address. If DHCP enabled, will show address assigned by DHCP server. If DHCP disabled, is IP address programmed by user.

Net mask – Network mask value. See above.

Gateway – Network gateway value. See above.

Troubleshooting Menu

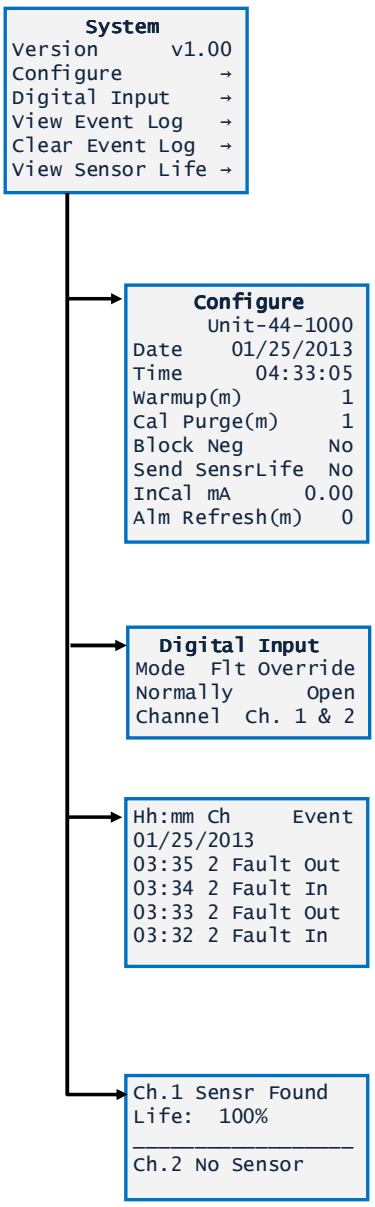
View Error Count – View a menu that tracks the number of network errors

Clear Error Count – Resets number of network errors to zero.

Figure 10-5: Comm Settings Menu

SYSTEM SETTINGS MENU

The Comm Settings Menu allows the user to configure the Ethernet interface, MODBUS/TCP slave and two optional RS-485 serial interfaces.



Configure Menu

Date & Time – Sets the system date and time. Used for display and event log entries.

Warm Up Delay – Sets length of time (in minutes) from power on to output signals active. During Warmup Delay the 4-20mA outputs are set to 4mA.

Cal Purge Delay - Sets length of time (in minutes) that outputs are disabled following a zero or span calibration

Block Negative – If YES, blocks screen from showing negative values.

Send Sensor Life – If YES, enables transmission of sensor life data across 4-20mA output (see GASMAX CX manual for more details).

InCal mA – Sets the 4-20mA output value to be transmitted during a calibration sequencer. Enables remote devices to track "In Cal" status.

Alarm Refresh – See GASMAX CX manual.

Digital Input Menu

Mode – Determines action if digital input (fault ack input) is activated.

Normally – If Normally OPEN the action will occur if the contacts close; if normally CLOSED the event will occur if the contacts open.

Channel – Determines which channel output is affected.

Event Log

Event Log Format – The event log includes the date, time and list of events that occur. Events include cold boot, system boot, alarm reset, remote alarm reset, log cleared, config edit, A1, A2 and A3 in and out, fault in and out, calibration in and out, calibration fail, communications error, config error and marker event.

Clear Event Log – Clears all entries in the event log.

View Sensor Life Menu

Life – Computed value based on initial stored 'gain' value when sensor was first calibrated. If new gain equals original gain, sensor life = 100%. If new gain equals twice original gain, sensor life = 0%.

Figure 10-6: System Settings Menu Tree

DIAGNOSTICS MENU

The Diagnostics page provides tools for use during setup or testing. Tests for optional features are not available if the feature is not installed.

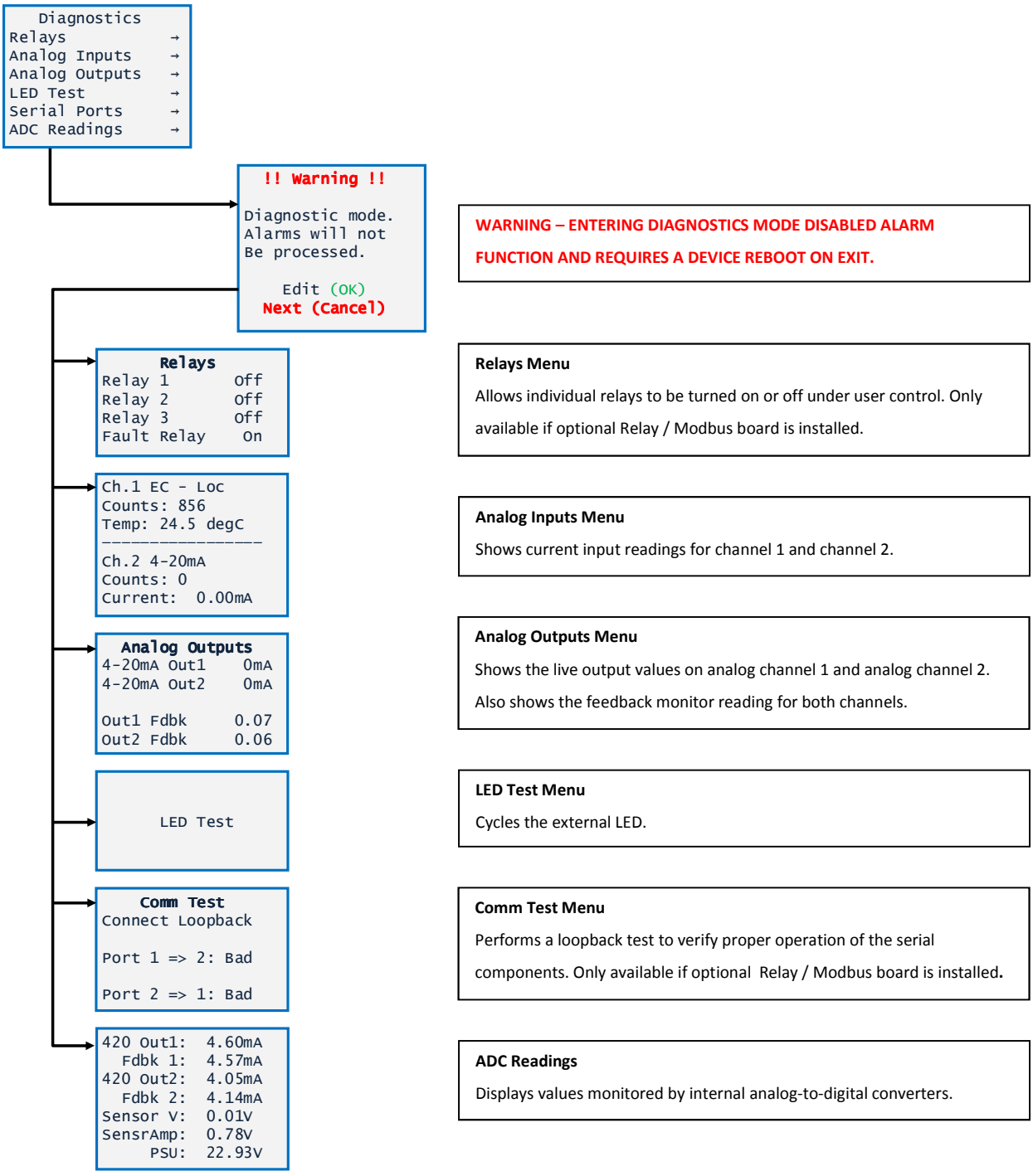

Diagnostics
Relays →
Analog Inputs →
Analog Outputs →
LED Test →
Serial Ports →
ADC Readings →
!! Warning !!
Diagnostic mode.
Alarms will not
Be processed.
Edit (OK)
Next (Cancel)
WARNING – ENTERING DIAGNOSTICS MODE DISABLED ALARM FUNCTION AND REQUIRES A DEVICE REBOOT ON EXIT.
Relays
Relay 1 Off
Relay 2 Off
Relay 3 Off
Fault Relay On
Relays Menu
Allows individual relays to be turned on or off under user control. Only available if optional Relay / Modbus board is installed.
Ch.1 EC - Loc
Counts: 856
Temp: 24.5 degC
Ch.2 4-20mA
Counts: 0
Current: 0.00mA
Analog Inputs Menu
Shows current input readings for channel 1 and channel 2.
Analog Outputs
4-20mA Out1 0mA
4-20mA Out2 0mA
Out1 Fdbk 0.07
Out2 Fdbk 0.06
Analog Outputs Menu
Shows the live output values on analog channel 1 and analog channel 2. Also shows the feedback monitor reading for both channels.
LED Test
LED Test Menu
Cycles the external LED.
Comm Test
Connect Loopback
Port 1 => 2: Bad
Port 2 => 1: Bad
Comm Test Menu
Performs a loopback test to verify proper operation of the serial components. Only available if optional Relay / Modbus board is installed.
420 Out1: 4.60mA
Fdbk 1: 4.57mA
420 Out2: 4.05mA
Fdbk 2: 4.14mA
Sensor V: 0.01V
SensrAmp: 0.78V
PSU: 22.93V
ADC Readings
Displays values monitored by internal analog-to-digital converters.

Figure 10-7: Diagnostics Menu Tree

11 MODBUS REGISTERS

The GDS-58NXP features a full complement of user-accessible MODBUS registers that can provide a complete snapshot of the gas detector configuration. This includes all real-time data, preset zero, span and calibration values and user-programmable text.

Variable Name	Alias	Read	Write	Notes
Ch 1 Analog Output Raw	31001	4	N/A	12 bit value; 800 = 4mA, 4000 = 20mA
Ch 2 Analog Output Raw	31002	4	N/A	12 bit value; 800 = 4mA, 4000 = 20mA
Ch 1 A2D Raw Counts	31003	4	N/A	12 bit value from A/D converter
Ch 2 A2D Raw Counts	31004	4	N/A	12 bit value from A/D converter
Ch 1 Sensor Life	31009	4	N/A	16 bit signed integer ranging from -1 to 100 where -1 indicates Cal Required
Ch 2 Sensor Life	31010	4	N/A	16 bit signed integer ranging from -1 to 100 where -1 indicates Cal Required
Ch 1 Sensor Temp	31011	4	N/A	16 bit integer from 1 to 4095 scaled for -55°C to +125°C
Ch 2 Sensor Temp	31012	4	N/A	16 bit integer from 1 to 4095 scaled for -55°C to +125°C
Ch 1 4-20mA Out FP	31210	4	N/A	32 bit floating point
Ch 2 4-20mA Out FP	31212	4	N/A	32 bit floating point
Ch 1 Output Feedback FP	31214	4	N/A	32 bit floating point
Ch 2 Output Feedback FP	31216	4	N/A	32 bit floating point
12V Input FP	31218	4	N/A	32 bit floating point
Sensor Volts FP	31220	4	N/A	32 bit floating point
Bridge Amp FP	31222	4	N/A	32 bit floating point
Bridge Out FP	31224	4	N/A	32 bit floating point
Product ID	32001	4	N/A	Factory use only
Version	32002	4	N/A	Factory use only
Custom Feature	32003	4	N/A	Factory use only
Customer ID	32004	4	N/A	Factory use only
Lock Status	32005	4	N/A	
Boot Year	32006	4	N/A	Last power-up time & date
Boot Month	32007	4	N/A	Last power-up time & date
Boot Day	32008	4	N/A	Last power-up time & date
Boot Hour	32009	4	N/A	Last power-up time & date
Boot Minute	32010	4	N/A	Last power-up time & date
Boot Second	32011	4	N/A	Last power-up time & date
SR 1 State	32020	4	N/A	True if relay #1 active
SR 2 State	32021	4	N/A	True if relay #2 active
SR 3 State	32022	4	N/A	True if relay #3 active
FR State	32023	4	N/A	True if fault relay active
Warmup	32025	4	N/A	True if unit in warm-up
SR 1 Flashing	32026	4	N/A	True if relay #1 flashing
SR 2 Flashing	32027	4	N/A	True if relay #2 flashing
SR 3 Flashing	32028	4	N/A	True if relay #3 flashing
FR Flashing	32029	4	N/A	True if fault relay flashing
DI State	32034	4	N/A	Digital input status
Ch 1 Fixed Point	33001	4	N/A	Compatible with GASMAX II
CH 2 Fixed Point	33002	4	N/A	Compatible with GASMAX II
Ch 1 Floating Point	33010	4	N/A	32 bit IEEE 754 float

Ch 1 Value String	33012	4	N/A	6 character string, zero terminated
Ch 1 Temperature Float	33015	4	N/A	Sensor temperature
Ch 1 A1 Status	33017	4	N/A	True if alarm 1 active
Ch 1 A1 Flashing	33018	4	N/A	True if alarm 1 indicator flashing
Ch 1 A2 Status	33019	4	N/A	True if alarm 2 active
Ch 1 A2 Flashing	33020	4	N/A	True if alarm 2 indicator flashing
Ch 1 A3 Status	33021	4	N/A	True if alarm 3 active
Ch 1 A3 Flashing	33022	4	N/A	True if alarm 3 indicator flashing
Ch 1 Fault Status	33023	4	N/A	True if fault active
Ch 1 Comm Error	33024	4	N/A	True if comm error
Ch 1 Config Error	33025	4	N/A	True if config error
Ch 1 I/O Error	33026	4	N/A	True if input/output error
Ch 1 Cal Flag	33027	4	N/A	True if calibration in progress
Ch 1 Marker Flag	33028	4	N/A	True if marker active
Ch 1 Linearize	33029	4	N/A	True if linearization table active
Ch 1 Err Flashing	33030	4	N/A	True if channel error
Ch 2 Floating Point	33040	4	N/A	32 bit IEEE 754 float
Ch 2 Value String	33042	4	N/A	6 character string, zero terminated
Ch 2 Temp Float	33045	4	N/A	Sensor temperature
Ch 2 A1 Status	33047	4	N/A	True if alarm 1 active
Ch 2 A1 Flashing	33048	4	N/A	True if alarm 1 indicator flashing
Ch 2 A2 Status	33049	4	N/A	True if alarm 2 active
Ch 2 A2 Flashing	33050	4	N/A	True if alarm 2 indicator flashing
Ch 2 A3 Status	33051	4	N/A	True if alarm 3 active
Ch 2 A3 Flashing	33052	4	N/A	True if alarm 3 indicator flashing
Ch 2 Fault Status	33053	4	N/A	True if fault active
Ch 2 Comm Error	33054	4	N/A	True if comm error
Ch 2 Config Error	33055	4	N/A	True if config error
Ch 2 I/O Error	33056	4	N/A	True if input/output error
Ch 2 Cal Flag	33057	4	N/A	True if calibration in progress
Ch 2 Marker Flag	33058	4	N/A	True if marker active
Ch 2 Linearize	33059	4	N/A	True if linearization table active
Ch 2 Err Flashing	33060	4	N/A	True if channel error
Alarm Reset	40001	N/A	3	Write to acknowledge alarm
System Name	40010	4	N/A	16 character ASCII text
Date Year	40020	3	N/A	Current time & date
Date Month	40021	3	N/A	Current time & date
Date Day	40022	3	N/A	Current time & date
Date Hour	40023	3	N/A	Current time & date
Date Minute	40024	3	N/A	Current time & date
Date Second	40025	3	N/A	Current time & date
Refresh Time	40026	3	N/A	Alarm refresh (minutes)
Warmup Time	40027	3	N/A	Warm up delay (minutes)
Cal Purge Time	40028	3	N/A	Cal purge delay (minutes)
Block Negative Flag	40029	3	N/A	True if prohibit display of neg values
Comm 1 Function	40030	3	N/A	MODBUS serial port #1
Comm 1 Baud Rate	40031	3	N/A	MODBUS serial port #1
Comm 1 Parity	40032	3	N/A	MODBUS serial port #1
Comm 1 Slave ID	40033	3	N/A	MODBUS serial port #1
Comm 1 Timeout	40034	3	N/A	MODBUS serial port #1
Comm 1 Poll Delay	40035	3	N/A	MODBUS serial port #1
Comm 1 Byte Order	40036	3	N/A	MODBUS serial port #1
Comm 1 Wireless T/O	40037	3	N/A	MODBUS serial port #1
Comm 1 LED Enable	40038	3	N/A	MODBUS serial port #1

Comm 2 Function	40040	3	N/A	MODBUS serial port #2
Comm 2 Baud Rate	40041	3	N/A	MODBUS serial port #2
Comm 2 Parity	40042	3	N/A	MODBUS serial port #2
Comm 2 Slave ID	40043	3	N/A	MODBUS serial port #2
Comm 2 Timeout	40044	3	N/A	MODBUS serial port #2
Comm 2 Poll Delay	40045	3	N/A	MODBUS serial port #2
Comm 2 Byte Order	40046	3	N/A	MODBUS serial port #2
Comm 2 Wireless T/O	40047	3	N/A	MODBUS serial port #2
Comm 2 LED Enable	40048	3	N/A	MODBUS serial port #2
DHCP Enabled	40050	3	N/A	Ethernet port; DHCP or fixed address
Host Name	40051	3	N/A	Ethernet port: 16 ASCII characters
IP Address	40066	3	N/A	Ethernet port: xxx.xxx.xxx.xxx
Net Mask	40070	3	N/A	Ethernet port: xxx.xxx.xxx.xxx
Gateway IP	40074	3	N/A	Ethernet port: xxx.xxx.xxx.xxx
Modbus TCP Byte Order	40080	3	N/A	MODBUS/TCP function
Modbus TCP Timeout	40081	3	N/A	MODBUS/TCP timeout (mSec)
Modbus TCP Poll Delay	40082	3	N/A	MODBUS/TCP poll delay (mSec)
Save Config	40095	N/A	3	Write command to save local config
Config Changed	40096	3	N/A	True if config changed since last read
Security Unlock	40099	3	N/A	TBD
Relay 1 A1 Votes	40101	3	N/A	Alarm relay #1 configuration
Relay 1 A2 Votes	40102	3	N/A	Alarm relay #1 configuration
Relay 1 A3 Votes	40103	3	N/A	Alarm relay #1 configuration
Relay 1 Fault Votes	40104	3	N/A	Alarm relay #1 configuration
Relay 1 Override	40105	3	N/A	Alarm relay #1 configuration
Relay 1 Ack	40107	3	N/A	Alarm relay #1 configuration
Relay 1 Failsafe	40108	3	N/A	Alarm relay #1 configuration
Relay 2 A1 Votes	40111	3	N/A	Alarm relay #2 configuration
Relay 2 A2 Votes	40112	3	N/A	Alarm relay #2 configuration
Relay 2 A3 Votes	40113	3	N/A	Alarm relay #2 configuration
Relay 2 Fault Votes	40114	3	N/A	Alarm relay #2 configuration
Relay 2 Override	40115	3	N/A	Alarm relay #2 configuration
Relay 2 Ack	40117	3	N/A	Alarm relay #2 configuration
Relay 2 Failsafe	40118	3	N/A	Alarm relay #2 configuration
Relay 3 A1 Votes	40121	3	N/A	Alarm relay #3 configuration
Relay 3 A2 Votes	40122	3	N/A	Alarm relay #3 configuration
Relay 3 A3 Votes	40123	3	N/A	Alarm relay #3 configuration
Relay 3 Fault Votes	40124	3	N/A	Alarm relay #3 configuration
Relay 3 Override	40125	3	N/A	Alarm relay #3 configuration
Relay 3 Ack	40127	3	N/A	Alarm relay #3 configuration
Relay 3 Failsafe	40128	3	N/A	Alarm relay #3 configuration
Force Sensor Upload	40141	3	N/A	Binary
Digital Input Mode	40150	3	N/A	Alarm ack or flow switch input
Digital Input Type	40151	3	N/A	Alarm ack or flow switch input
Digital Input Mode	40152	3	N/A	Alarm ACK or flow switch input
Send Sensor Life	40153	3	N/A	True if transmit sensor life value
Contact Info String	40160	3	N/A	16 ASCII characters (2 per register)
Ch 1 Measurement Name	40401	3	N/A	16 ASCII characters (2 per register)
Ch 2 Measurement Name	40409	3	N/A	16 ASCII characters (2 per register)
Ch 1 EUNITS	40423	3	N/A	10 ASCII characters (2 per register)
Ch 2 EUNITS	40428	3	N/A	10 ASCII characters (2 per register)
Ch 1 Preamp gain	40433	3	N/A	Contact factory
Ch 2 Preamp gain	40434	3	N/A	Contact factory

Ch 1 Cal Zero	42001	3	N/A	Modbus 32 bit IEEE 754 Floating Pt
Ch 1 Cal Span	42003	3	N/A	Modbus 32 bit IEEE 754 Floating Pt
Ch 1 Zero Value	42005	3	N/A	Modbus 32 bit IEEE 754 Floating Pt
Ch 1 Span Value	42007	3	N/A	Modbus 32 bit IEEE 754 Floating Pt
Ch 1 Fault Value	42009	3	N/A	Modbus 32 bit IEEE 754 Floating Pt
Ch 1 Alarm 1 Setpoint	42011	3	N/A	Modbus 32 bit IEEE 754 Floating Pt
Ch 1 Alarm 2 Setpoint	42013	3	N/A	Modbus 32 bit IEEE 754 Floating Pt
Ch 1 Alarm 3 Setpoint	42015	3	N/A	Modbus 32 bit IEEE 754 Floating Pt
Ch 1 Manual Gain	42017	3	N/A	Modbus 32 bit IEEE 754 Floating Pt
Ch 1 Manual Offset	42019	3	N/A	Modbus 32 bit IEEE 754 Floating Pt
Ch 2 Cal Zero Value	42021	3	N/A	Modbus 32 bit IEEE 754 Floating Pt
Ch 2 Cal Span Value	42023	3	N/A	Modbus 32 bit IEEE 754 Floating Pt
Ch 2 Zero Value	42025	3	N/A	Modbus 32 bit IEEE 754 Floating Pt
Ch 2 Span Value	42027	3	N/A	Modbus 32 bit IEEE 754 Floating Pt
Ch 2 Fault Value	42029	3	N/A	Modbus 32 bit IEEE 754 Floating Pt
Ch 2 Alarm 1 Setpoint	42031	3	N/A	Modbus 32 bit IEEE 754 Floating Pt
Ch 2 Alarm 2 Setpoint	42033	3	N/A	Modbus 32 bit IEEE 754 Floating Pt
Ch 2 Alarm 3 Setpoint	42035	3	N/A	Modbus 32 bit IEEE 754 Floating Pt
Ch 2 Manual Gain	42037	3	N/A	Modbus 32 bit IEEE 754 Floating Pt
Ch 2 Manual Offset	42039	3	N/A	Modbus 32 bit IEEE 754 Floating Pt
Ch 1 Alarm 1 Latch	43001	3	N/A	False = NO, True = YES
Ch 1 Alarm 1 Trip	43002	3	N/A	False = HIGH, True = LOW
Ch 1 Alarm 1 On Delay	43003	3	N/A	Activation delay in seconds
Ch 1 Alarm 1 Off Delay	43004	3	N/A	Deactivation delay in minutes
Ch 1 Alarm 1 Hysteresis	43005	3	N/A	Percent of scale
Ch 1 Alarm 2 Latch	43011	3	N/A	False = NO, True = YES
Ch 1 Alarm 2 Trip	43012	3	N/A	False = HIGH, True = LOW
Ch 1 Alarm 2 On Delay	43013	3	N/A	Activation delay in seconds
Ch 1 Alarm 2 Off Delay	43014	3	N/A	Deactivation delay in minutes
Ch 1 Alarm 2 Hysteresis	43015	3	N/A	Percent of scale
Ch 1 Alarm 2 Color	43016	3	N/A	TBD
Ch 1 Alarm 3 Latch	43021	3	N/A	False = NO, True = YES
Ch 1 Alarm 3 Trip	43022	3	N/A	False = HIGH, True = LOW
Ch 1 Alarm 3 On Delay	43023	3	N/A	Activation delay in seconds
Ch 1 Alarm 3 Off Delay	43024	3	N/A	Deactivation delay in minutes
Ch 1 Alarm 3 Hysteresis	43025	3	N/A	Percent of scale
Ch 1 Alarm 3 Color	43026	3	N/A	TBD
Ch 1 Alarm 3 Enabled	43027	3	N/A	False = NO, True = YES
Ch 1 Data From	43031	3	N/A	Selection
Ch 1 Min Raw	43032	3	N/A	Binary (800)
Ch 1 Max Raw	43033	3	N/A	Binary (4000)
Ch 1 Remote ID	43034	3	N/A	Binary
Ch 1 Interface	43035	3	N/A	Binary
Ch 1 Byte Order	43036	3	N/A	Byte order
Ch 1 Alias	43037	3	N/A	Binary, 32 bit, 2x
Ch 1 IP Address	43039	3	N/A	Binary, 4x unsigned bytes
Ch 1 Port	43041	3	N/A	Binary, 32 bit, 2x
Ch 1 Remote Sensor	43043	3	N/A	Binary
Ch 1 DP	43079	3	N/A	Number of decimal points
Ch 1 Enable	43080	3	N/A	False = NO, True = YES
Ch 1 Deadband	43081	3	N/A	Modbus 32 bit IEEE 754 Floating Pt
Ch 1 Marker Enable	43083	3	N/A	False = NO, True = YES
Ch 1 Marker Percent	43084	3	N/A	Modbus 32 bit IEEE 754 Floating Pt
Ch 1 Marker Info	43086	3	N/A	6 ASCII characters

Ch 1 Marker Life	43089	3	N/A	Binary
Ch 1 Filter Count	43090	3	N/A	Binary, 0 to 60
Ch 1 Radio Reg	43091	3	N/A	Binary
Ch 1 Coefficient	43092	3	N/A	Binary
Ch 1 Bridge Voltage	43093	3	N/A	Modbus 32 bit IEEE 754 Floating Pt
Ch 1 Balance	43095	3	N/A	Binary
Ch 1 Heater Enable	43096	3	N/A	False = NO, True = YES
Ch 1 Heater Setpoint	43097	3	N/A	Modbus 32 bit IEEE 754 Floating Pt
Ch 1 Temp Comp -40	43099	3	N/A	32 bit FP Gain, 32 bit FP Offset
Ch 1 Temp Comp -30	43103	3	N/A	32 bit FP Gain, 32 bit FP Offset
Ch 1 Temp Comp -20	43107	3	N/A	32 bit FP Gain, 32 bit FP Offset
Ch 1 Temp Comp -10	43111	3	N/A	32 bit FP Gain, 32 bit FP Offset
Ch 1 Temp Comp 0	43115	3	N/A	32 bit FP Gain, 32 bit FP Offset
Ch 1 Temp Comp +10	43119	3	N/A	32 bit FP Gain, 32 bit FP Offset
Ch 1 Temp Comp +20	43123	3	N/A	32 bit FP Gain, 32 bit FP Offset
Ch 1 Temp Comp +30	43127	3	N/A	32 bit FP Gain, 32 bit FP Offset
Ch 1 Temp Comp +40	43131	3	N/A	32 bit FP Gain, 32 bit FP Offset
Ch 1 Temp Comp +50	43135	3	N/A	32 bit FP Gain, 32 bit FP Offset
Ch 1 Temp Comp +60	43139	3	N/A	32 bit FP Gain, 32 bit FP Offset
Ch 1 Sensor Type	43143	3	N/A	TBD
Ch 1 Send Sensor Life	43144	3	N/A	False = NO, True = YES
Ch 1 Cal mA Setting	43145	3	N/A	Modbus 32 bit IEEE 754 Floating Pt
Ch 1 Local Cal	43147	3	N/A	False = NO, True = YES
Ch 1 AI Range	43148	3	N/A	TBD
Ch 2 Alarm 1 Latch	43201	3	N/A	False = NO, True = YES
Ch 2 Alarm 1 Trip	43202	3	N/A	False = HIGH, True = LOW
Ch 2 Alarm 1 On Delay	43203	3	N/A	Activation delay in seconds
Ch 2 Alarm 1 Off Delay	43204	3	N/A	Deactivation delay in minutes
Ch 2 Alarm 1 Hysteresis	43205	3	N/A	Percent of scale
Ch 2 Alarm 2 Latch	43211	3	N/A	False = NO, True = YES
Ch 2 Alarm 2 Trip	43212	3	N/A	False = HIGH, True = LOW
Ch 2 Alarm 2 On Delay	43213	3	N/A	Activation delay in seconds
Ch 2 Alarm 2 Off Delay	43214	3	N/A	Deactivation delay in minutes
Ch 2 Alarm 2 Hysteresis	43215	3	N/A	Percent of scale
Ch 2 Alarm 2 Color	43216	3	N/A	TBD
Ch 2 Alarm 3 Latch	43221	3	N/A	False = NO, True = YES
Ch 2 Alarm 3 Trip	43222	3	N/A	False = HIGH, True = LOW
Ch 2 Alarm 3 On Delay	43223	3	N/A	Activation delay in seconds
Ch 2 Alarm 3 Off Delay	43224	3	N/A	Deactivation delay in minutes
Ch 2 Alarm 3 Hysteresis	43225	3	N/A	Percent of scale
Ch 2 Alarm 3 Color	43226	3	N/A	TBD
Ch 2 Alarm 3 Enabled	43227	3	N/A	False = NO, True = YES
Ch 2 Data From	43231	3	N/A	Selection
Ch 2 Min Raw	43232	3	N/A	Binary (800)
Ch 2 Max Raw	43233	3	N/A	Binary (4000)
Ch 2 Remote ID	43234	3	N/A	Binary
Ch 2 Interface	43235	3	N/A	Binary
Ch 2 Byte Order	43236	3	N/A	Byte order
Ch 2 Alias	43237	3	N/A	Binary, 32 bit, 2x
Ch 2 IP Address	43239	3	N/A	Binary, 4x unsigned bytes
Ch 2 Port	43241	3	N/A	Binary, 32 bit, 2x
Ch 2 Remote Sensor	43243	3	N/A	Binary
Ch 2 DP	43279	3	N/A	Number of decimal points
Ch 2 Enable	43280	3	N/A	False = NO, True = YES

Ch 2 Deadband	43281	3	N/A	Modbus 32 bit IEEE 754 Floating Pt
Ch 2 Marker Enable	43283	3	N/A	False = NO, True = YES
Ch 2 Marker Percent	43284	3	N/A	Modbus 32 bit IEEE 754 Floating Pt
Ch 2 Marker Info	43286	3	N/A	6 ASCII characters
Ch 2 Marker Life	43289	3	N/A	Binary
Ch 2 Filter Count	43290	3	N/A	Binary, 0 to 60
Ch 2 Radio Reg	43291	3	N/A	Binary
Ch 2 Coefficient	43292	3	N/A	Binary
Ch 2 Bridge Voltage	43293	3	N/A	Modbus 32 bit IEEE 754 Floating Pt
Ch 2 Balance	43295	3	N/A	Binary
Ch 2 Heater Enable	43296	3	N/A	False = NO, True = YES
Ch 2 Heater Setpoint	43297	3	N/A	Modbus 32 bit IEEE 754 Floating Pt
Ch 2 Temp Comp -40	43299	3	N/A	32 bit FP Gain, 32 bit FP Offset
Ch 2 Temp Comp -30	43303	3	N/A	32 bit FP Gain, 32 bit FP Offset
Ch 2 Temp Comp -20	43307	3	N/A	32 bit FP Gain, 32 bit FP Offset
Ch 2 Temp Comp -10	43311	3	N/A	32 bit FP Gain, 32 bit FP Offset
Ch 2 Temp Comp 0	43315	3	N/A	32 bit FP Gain, 32 bit FP Offset
Ch 2 Temp Comp +10	43319	3	N/A	32 bit FP Gain, 32 bit FP Offset
Ch 2 Temp Comp +20	43323	3	N/A	32 bit FP Gain, 32 bit FP Offset
Ch 2 Temp Comp +30	43327	3	N/A	32 bit FP Gain, 32 bit FP Offset
Ch 2 Temp Comp +40	43331	3	N/A	32 bit FP Gain, 32 bit FP Offset
Ch 2 Temp Comp +50	43335	3	N/A	32 bit FP Gain, 32 bit FP Offset
Ch 2 Temp Comp +60	43339	3	N/A	32 bit FP Gain, 32 bit FP Offset
Ch 2 Sensor Type	43343	3	N/A	TBD
Ch 2 Send Sensor Life	43344	3	N/A	False = NO, True = YES
Ch 2 Cal mA Setting	43345	3	N/A	Modbus 32 bit IEEE 754 Floating Pt
Ch 2 Local Cal	43347	3	N/A	False = NO, True = YES
Ch 2 AI Range	43348	3	N/A	TBD
Ch 1 Value	45001	3	N/A	800 = “0”, 4000 = Full Scale
Ch 2 Value	45002	3	N/A	800 = “0”, 4000 = Full Scale
Ch 1 Value	45003/04	3	N/A	MODBUS 32 bit floating point
Ch 2 Value	45005/06	3	N/A	MODBUS 32 bit floating point
Ch 1 Alarm 1 Status	45007	3	N/A	“1” = Fault
Ch 1 Alarm 2 Status	45008	3	N/A	“1” = Fault
Ch 1 Alarm 3 Status	45009	3	N/A	“1” = Fault
Ch 1 Fault Status	45010	3	N/A	“1” = Fault
Ch 2 Alarm 1 Status	45011	3	N/A	“1” = Fault
Ch 2 Alarm 2 Status	45012	3	N/A	“1” = Fault
Ch 2 Alarm 3 Status	45013	3	N/A	“1” = Fault
Ch 2 Fault Status	45014	3	N/A	“1” = Fault
Ch 1 Sensor Life	45015	3	N/A	0-100 binary
Ch 2 Sensor Life	45016	3	N/A	0-100 binary
Ch 1 Sensor Temp	45017	3	N/A	Binary 0 - 4095
Ch2 Sensor Temp	45018	3	N/A	Binary 0 - 4095
Ch 1 Sensor Temp	45019/20	3	N/A	MODBUS 32 bit floating point
Ch 2 Sensor Temp	45021/22	3	N/A	MODBUS 32 bit floating point

12 SPARE PARTS

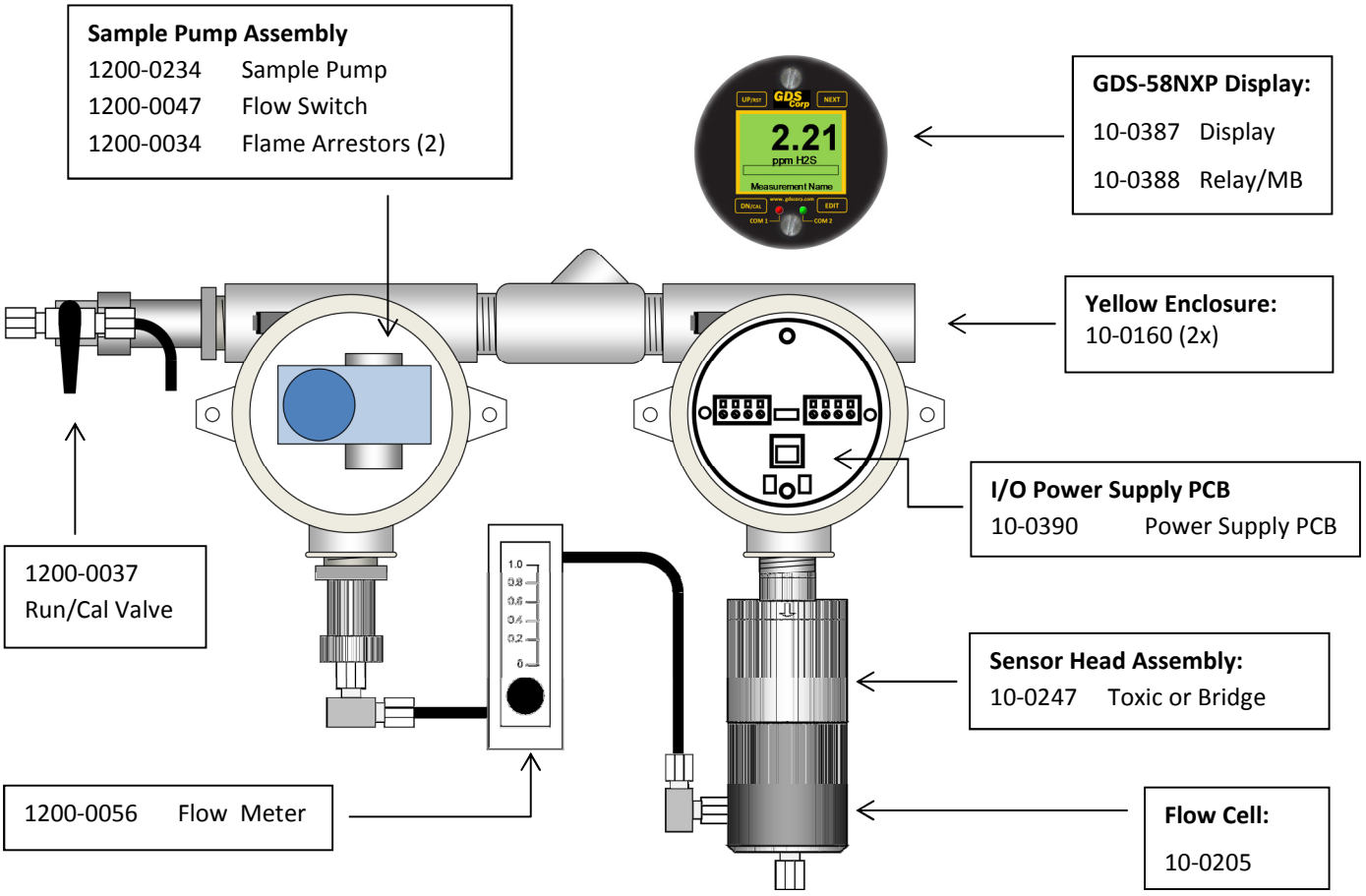


Figure 12-1: GDS-58NXP Assembly with Toxic / Bridge Sensor (Spare Parts)

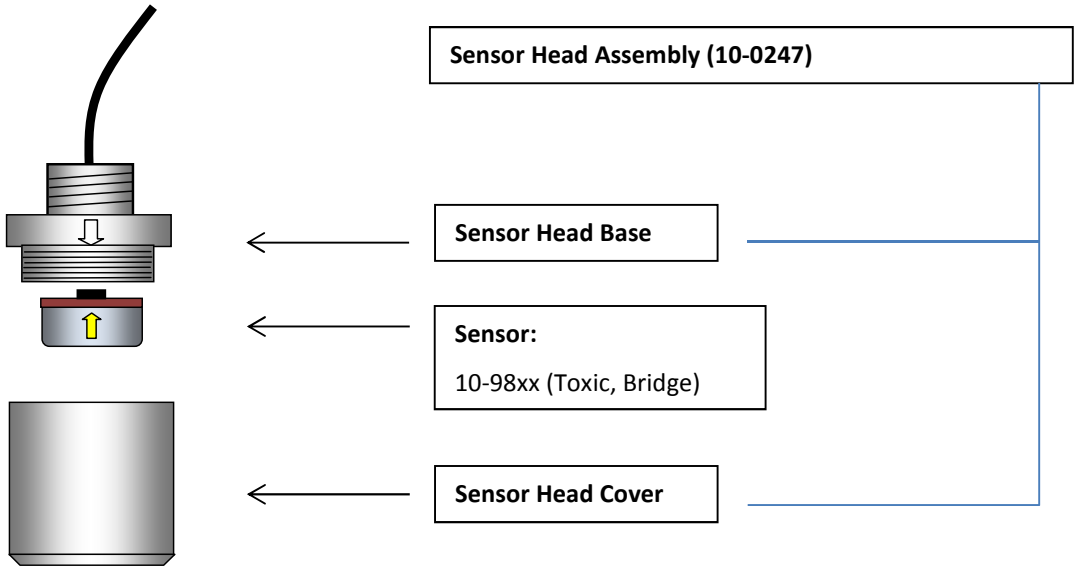


Figure 12-2: GDS-58NXP Standard Sensor Head Exploded View

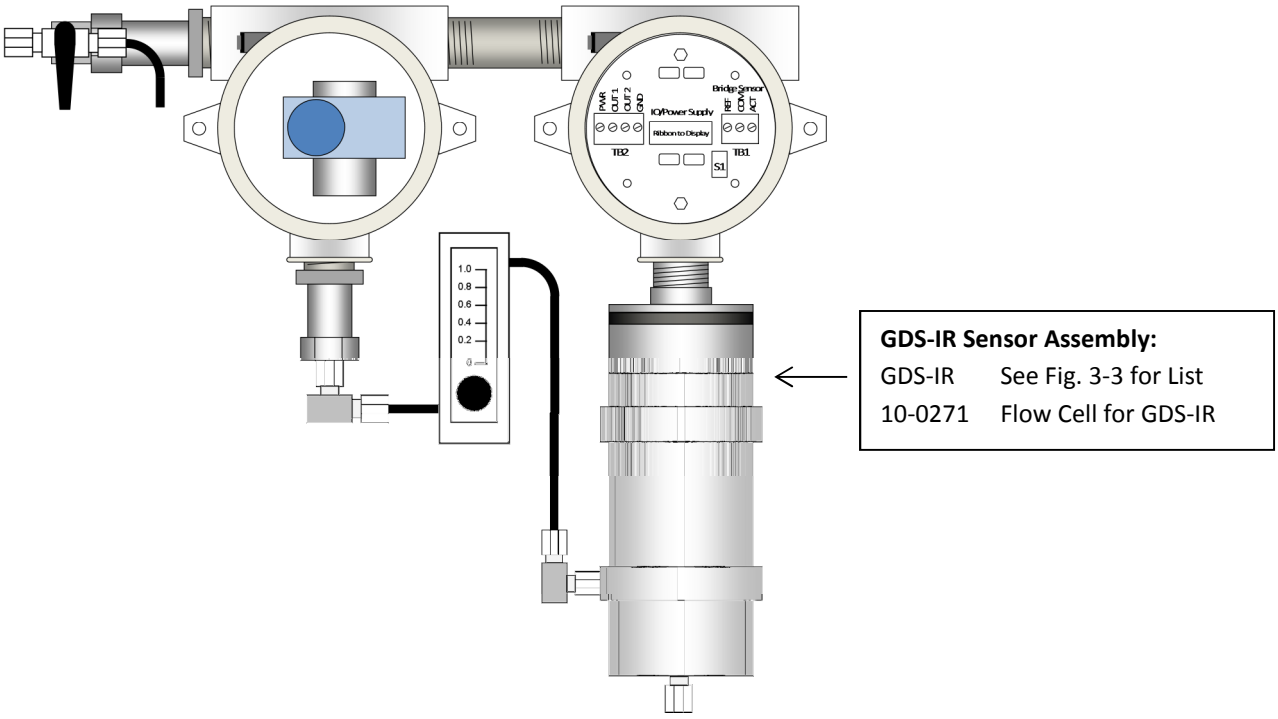


Figure 12-3: GDS-58NXP Assembly with GDS-IR (Spare Parts)

13 DRAWINGS AND DIMENSIONS

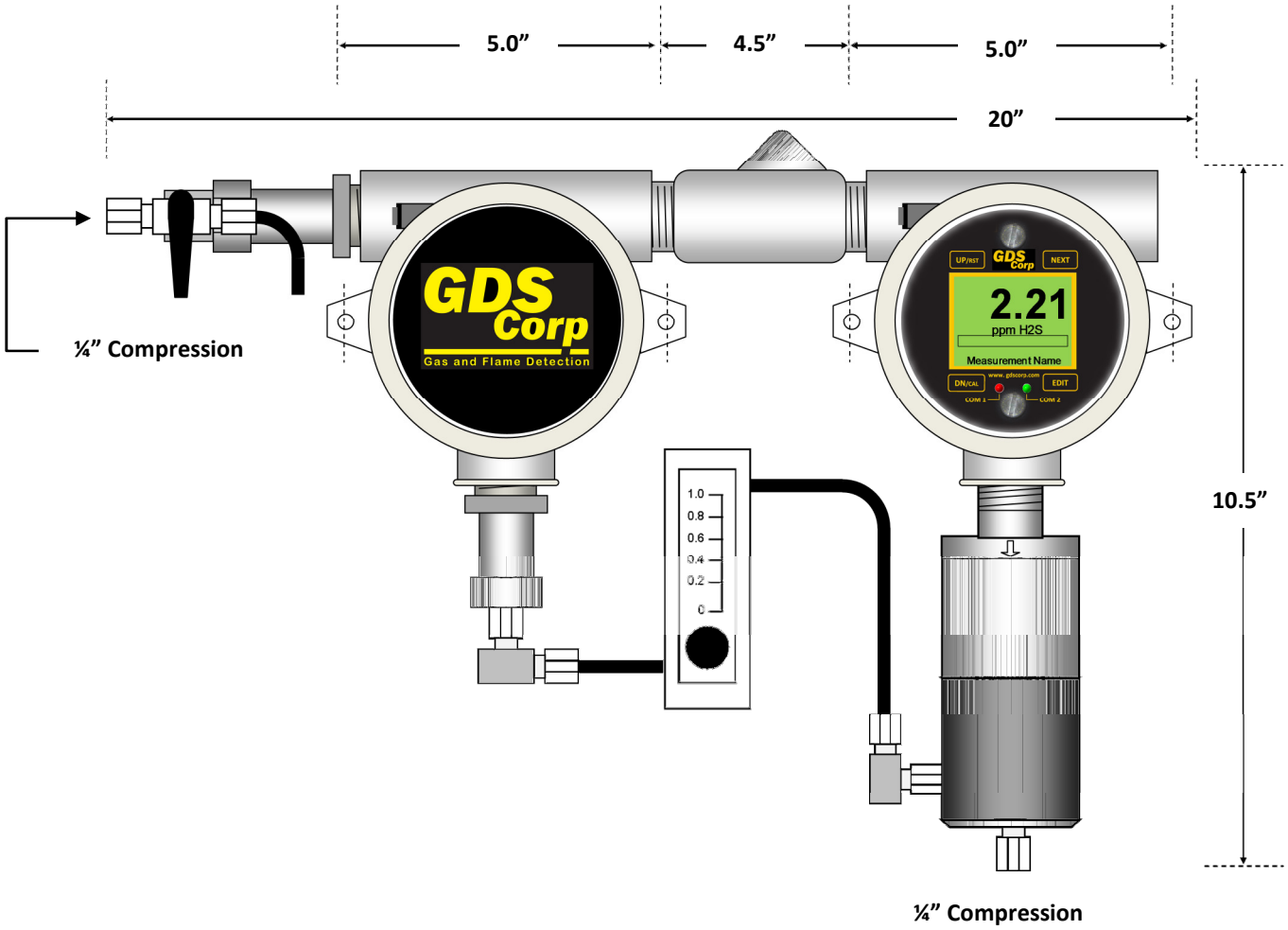


Figure 13-1: GDS-58NXP Dimensions (Aluminum Enclosure)

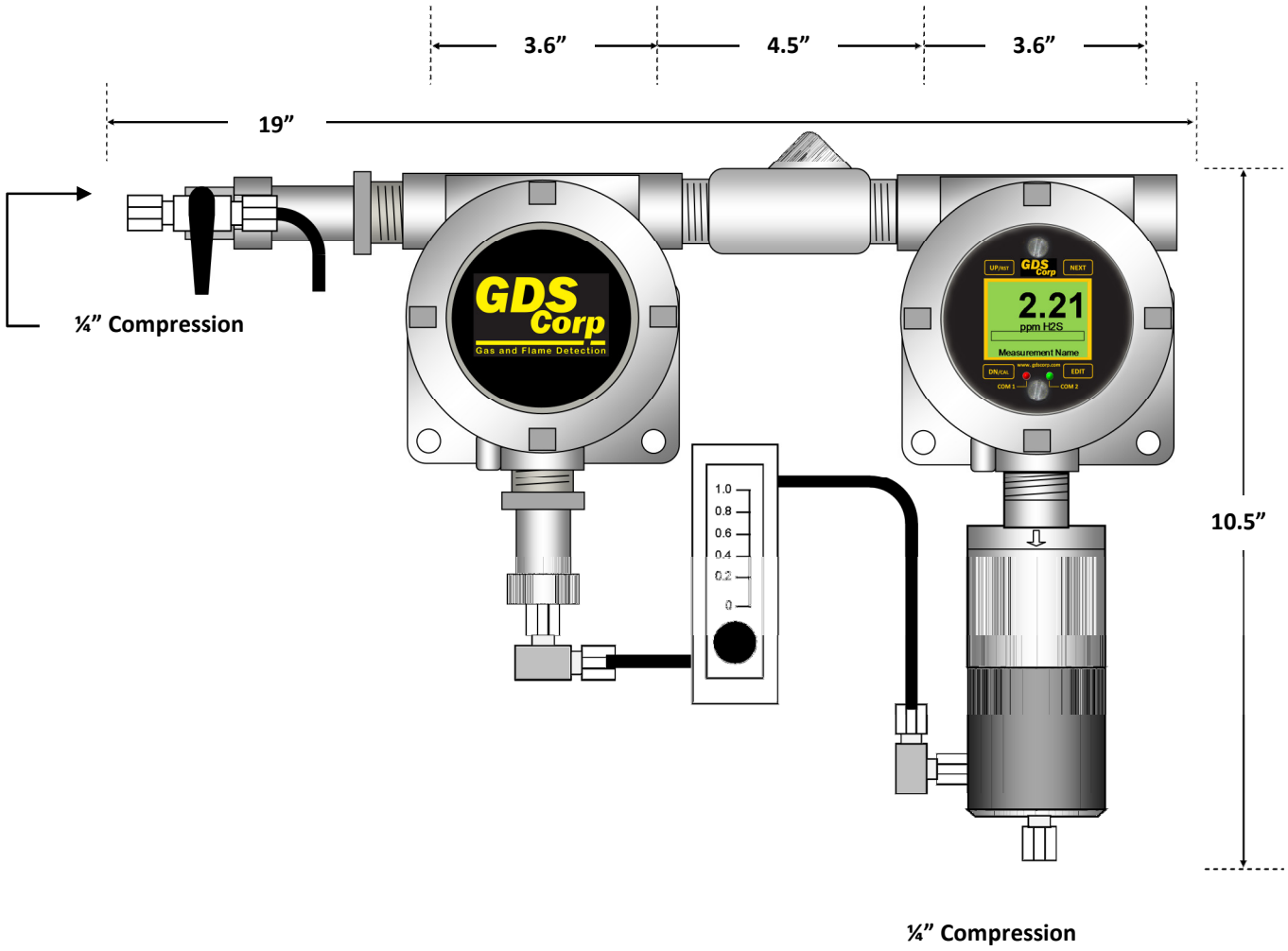


Figure 13-2: GDS-58NXP Dimensions (Stainless Steel Enclosure)

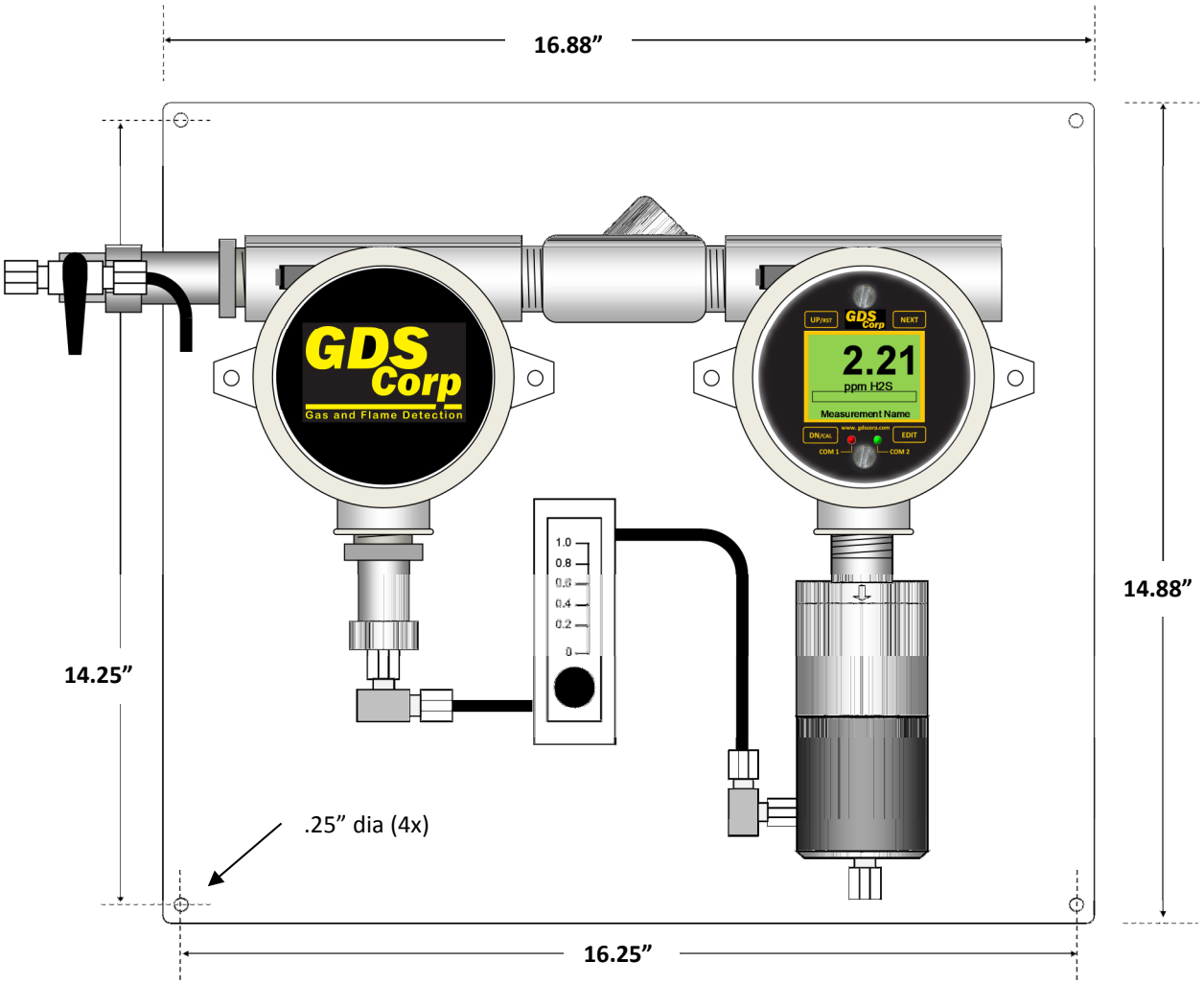


Figure 13-3: GDS-58NXP 17” x 15” Mounting Plate Dimensions

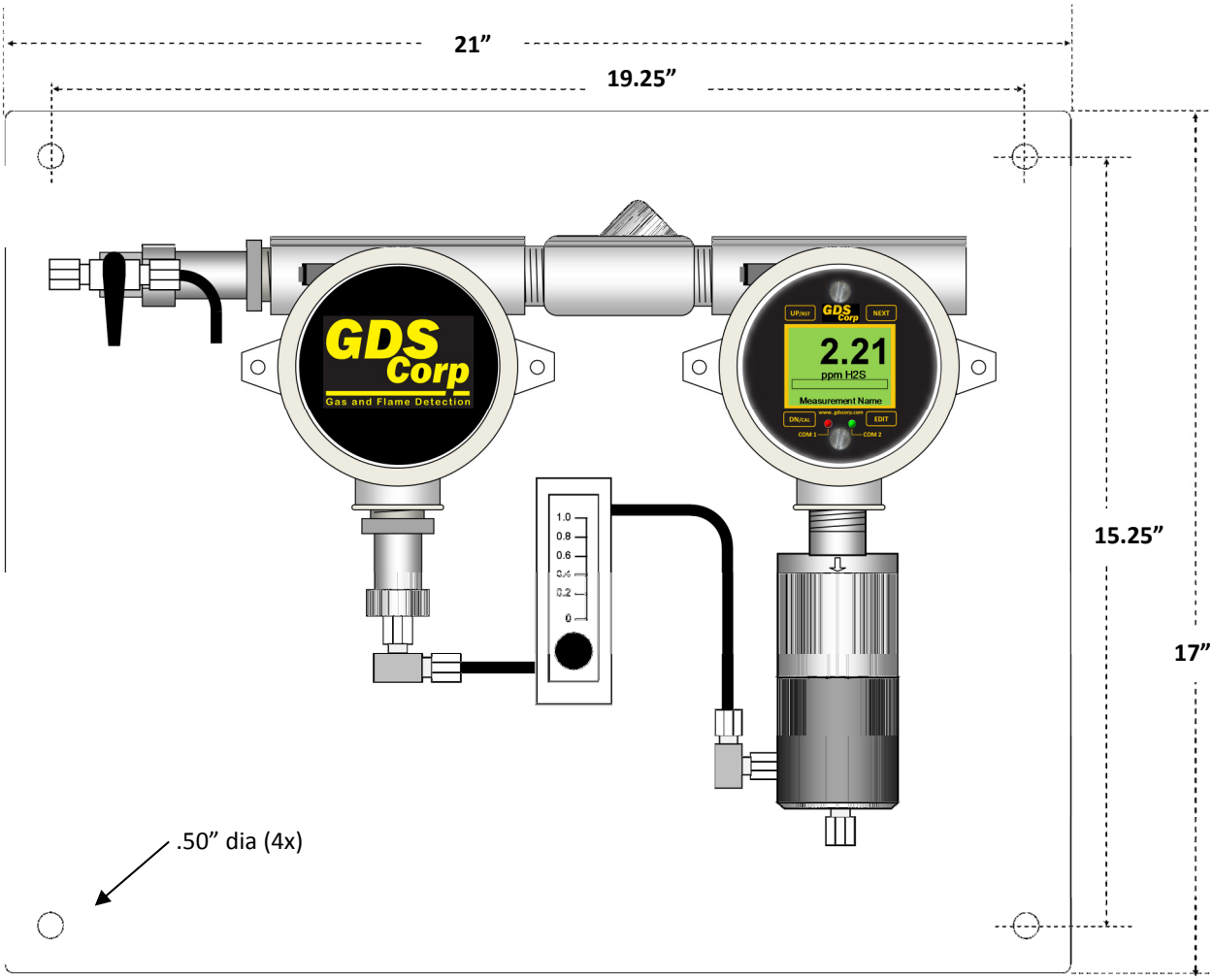


Figure 13-4: GDS-58NXP 21” x 17” Mounting Plate Dimensions

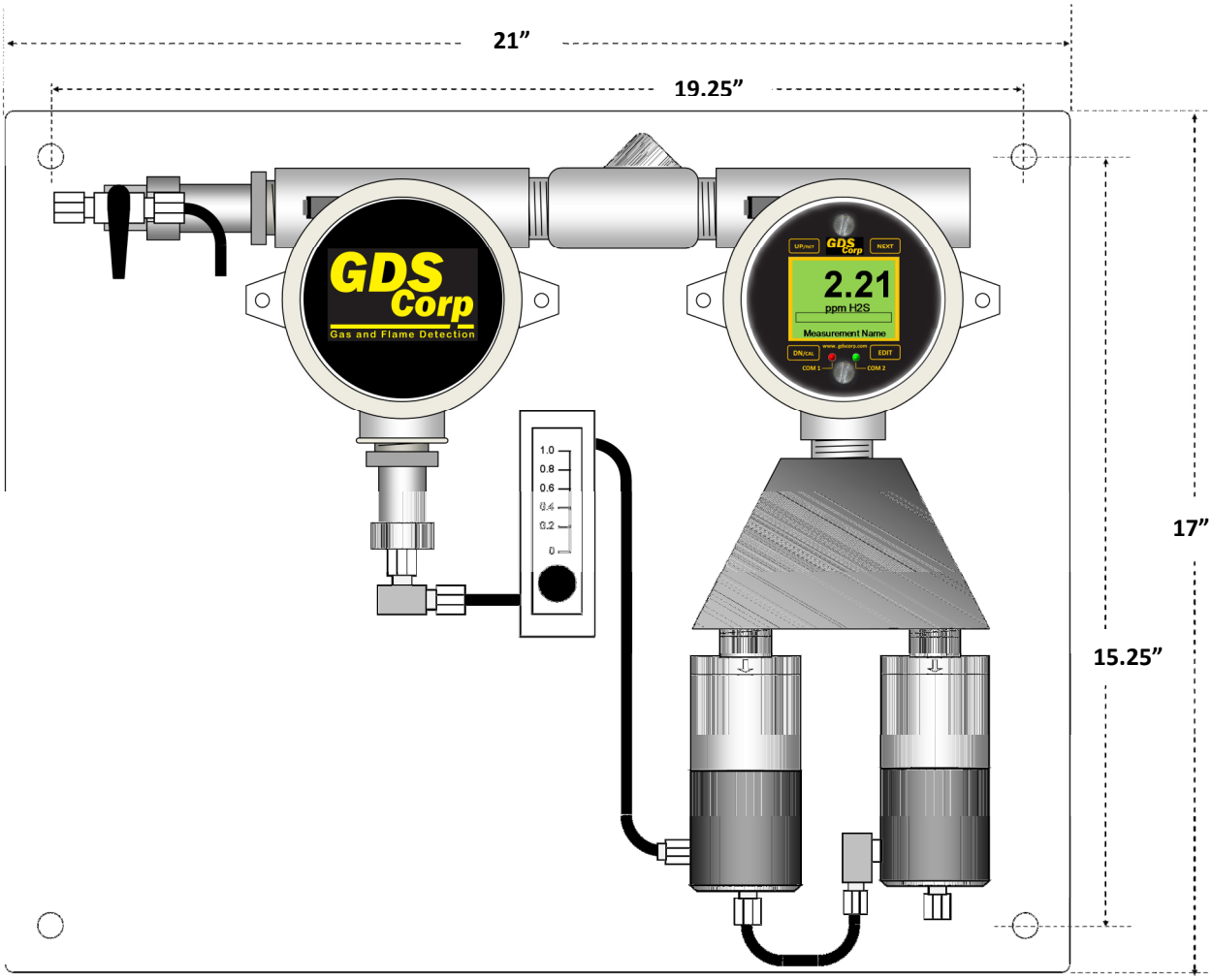


Figure 13-5: GDS-58NXP 21” x 17” Mounting Plate (Dual Sensor)

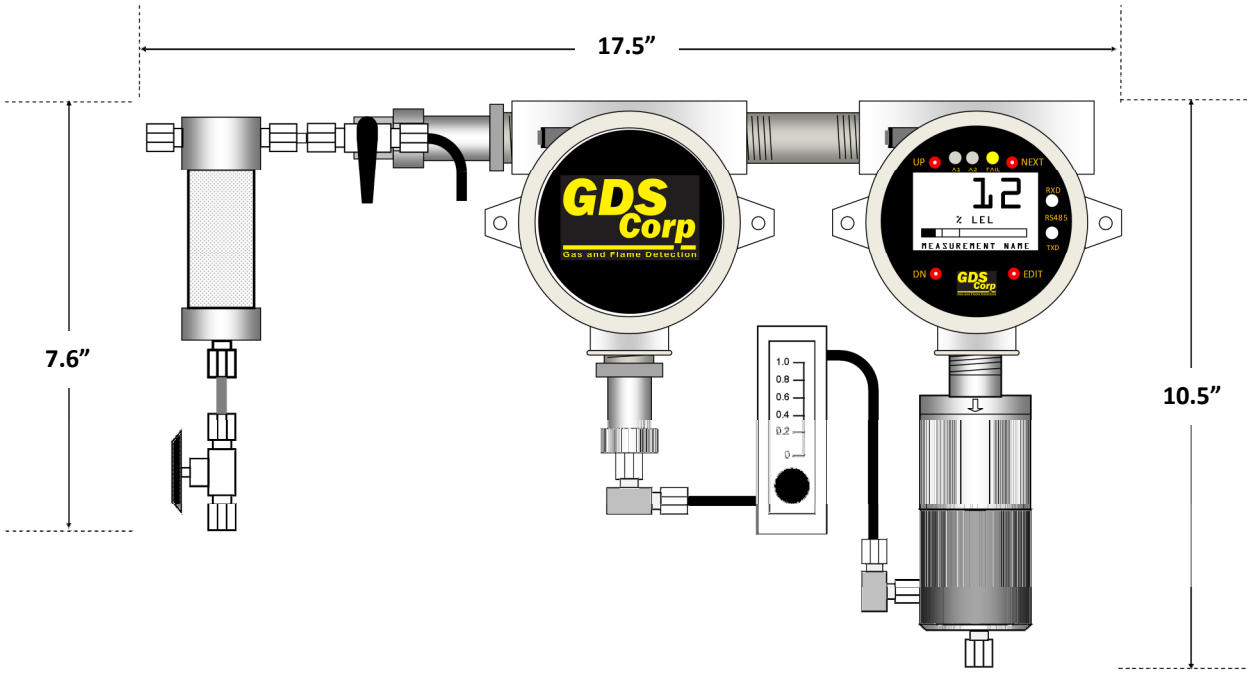


Figure 13-6: GDS-58NXP with Optional Clear Coalescing Filter

14 WIRING DIAGRAMS

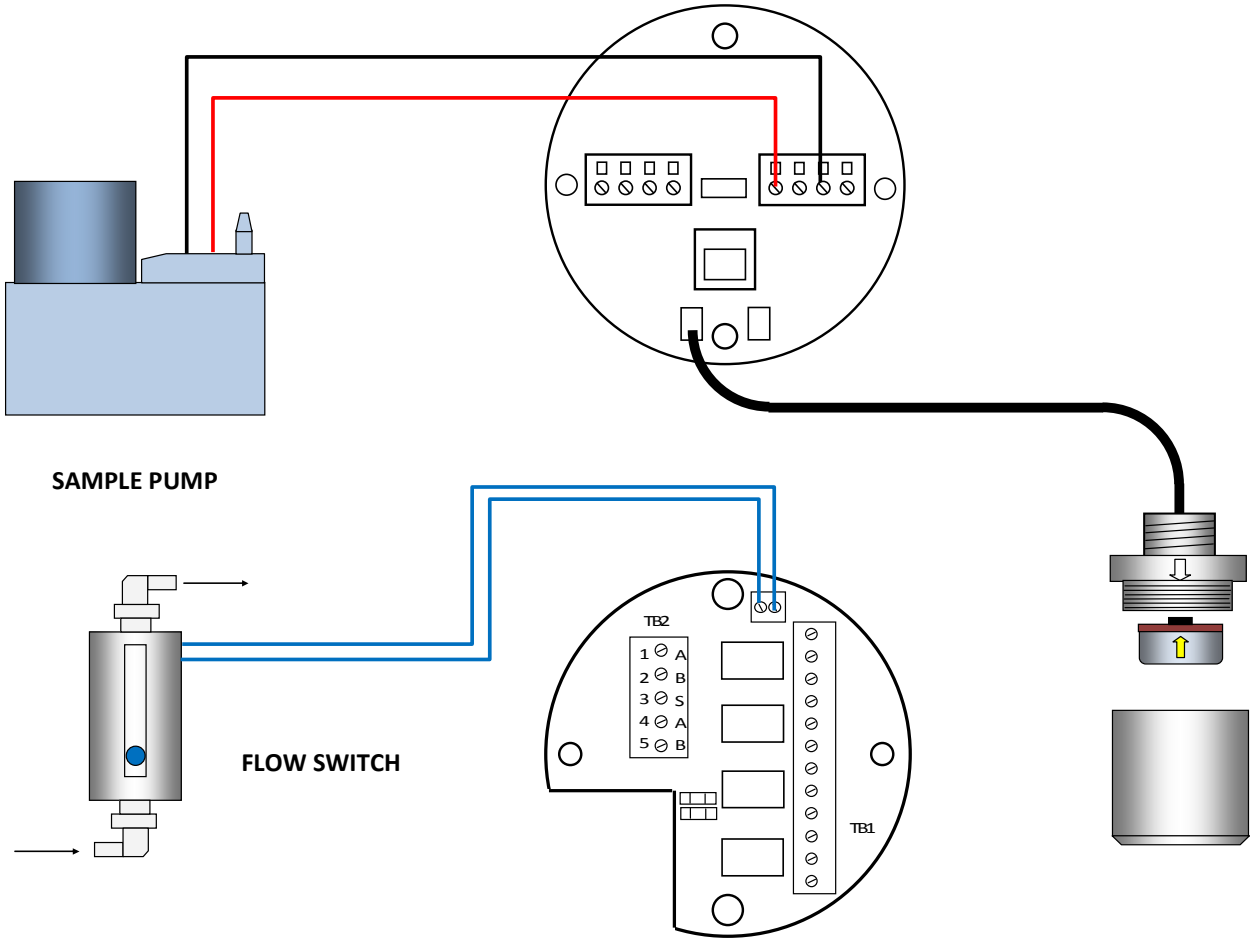


Figure 14-1: GDS-58NXP Wiring Diagram

15 SAMPLE DRAW DUCT ASSEMBLY 20-0141

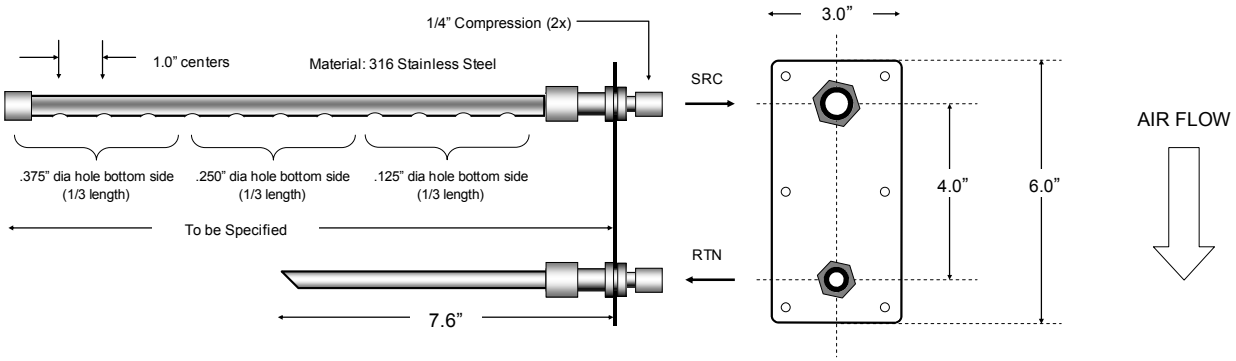


Figure 15-1: Sample Draw Duct Assembly

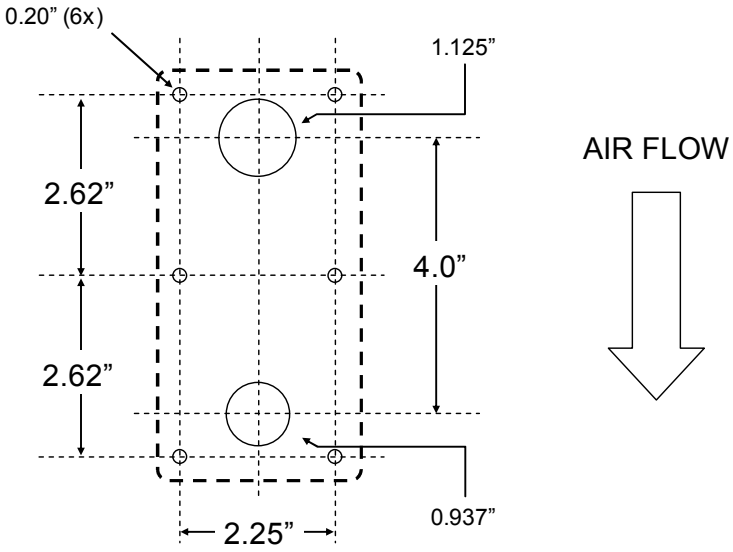


Figure 15-2: Sample Draw Duct Assembly Hole Mounting Pattern

NOTE: APPLY GASKET SEAL ON FACE OF PLATE WHEN INSTALLING SAMPLE DRAW DUCT ASSEMBLY